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MULTISPECTRAL DETERMINATION OF SOIL MOISTURE II

Principal Investigator: John E. Estes

Co-Principal Investigator: David S. Simonett

Authors:

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Annual Technical Report April, 1982

NASA Grant NCC-5-5

This work performed in association with Dr. Bruce Blanchard,
Texas A & M University, Remote Sensing Center
College Station, Texas 77843

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MULTI-SENSOR DETERMINATION OF SOIL MOISTURE

I. Introduction

The Guymon soil moisture data set which was the source for the analyses reported by Hajic (1981) was revised.* This revised Guymon data and the Dalhart soil moisture data collected on August 14, 16, and 18, 1980 have each been grouped into four field cover types for statistical analysis. The Guymon data is grouped as bare, alfalfa, milo with rows perpendicular to the field of view, and milo viewed parallel to the field of view. The Dalhart data is grouped as bare combo (including bare stubble, pasture, and millet), stubble (including vegetated, disked, wheat and mulched stubble), disked stubble, and corn fields. Tables 1A and 1B show the data collection fields and dates for each cover type in the Guymon and Dalhart data sets respectively. Tables 2A and 2B summarize the variables and associated symbols used in the analysis. Prefix and suffix symbols are explained and data set names identified.

The organization of the analysis summary is parametric in field cover type with the same types of analyses performed for each cover type. It is preceded by an overview with summary graphs which combine selected analyses to compare the effects of field cover. The analysis for each of the cover types is presented principally in the form of graphs and tables with only brief commentary since in-depth examination of these results has not yet been done.

The remainder of the report consists of tables of elementary statistics, correlation matrices, and single variable regressions. A concluding chapter summarizes selected eigenvector and factor analyses. The elementary

*Per revisions by TAMU, Spring 1981.

statistics provide the mean and standard derivation of all variables. Correlation matrices were determined for high correlating sensors and for correlation between soil depths. The highest correlating sensor types for SM02 (Guymon) and FLD02 (Dalhart) are summarized via tables of the intercepts and regression coefficients. These variables represent the values of the flight line volumetric soil moisture in the 0-2 cm depth layer and the field average volumetric soil moisture in 0-2 cm depth layer respectively.

Table 1A

Data Source: Field and Date

Guymon 1978

Bare - (108 observations)

Field	8-2	8-5	8-8	8-11	8-14	8-17
2						
6						
2X						
21						
10						
14						
17						
26						

Milperp - (72 observations)

Field	8-2	8-5	8-8	8-11	8-14	8-17
4						
13						
22						
27						

Milpar - (72 observations)

Field	8-2	8-5	8-8	8-11	8-14	8-17
7						
8						
1A						
15						
2A						

Alfalfa - (48 observations)

Field	8-2	8-5	8-8	8-11	8-14	8-17
4						
13						
22						
27						

Table 13

Data Source: Field and Date

Dalhart 1980

Bare Combo - (24 observations)

Field	8-14	8-16	8-18
3 B			
4 B			
3			
4			
5			
6			

Disked Stubble - (24 observations)

Field	8-14	8-16	8-18
15			
16			
19			
20			
21			
22			

Stubble Combined - (56 observations)

Field	8-14	8-16	8-18
13			
14			
* 15			
* 16			
17			
18			
* 19			
* 20			
* 21			
* 22			
3w			
4w			

Corn - (32 observations)

Field	8-14	8-16	8-18
1			
2			
7			
8			
9			
10			
11			
12			

* Fields used also in Disked Stubble analysis

Table 2A

Guymon Soil Moisture and Sensor Channel Variables

Volumetric Soil Moisture (%)

		upper depth	lower depth
SMØ2	FLDØ2	Ø cm	2 cm
SM25	FLD25	2	5
SM59	FLD59	5	9
SM915	FLD915	9	15
SMØ15	FLDØ15	Ø	15
SM153Ø	FLD153Ø	15	3Ø
SM3Ø45	FLD3Ø45	3Ø	45

SM(prefix) data are averages of selected field sample points lying along the track of the flight line. Data in percent.

FLD(prefix) data are averages of all the field sample points. Data in percent.

Scatterometers

VV133L5	HH16L5	HV16L5	HH4L5	HV4L5
VV133L10	HH16L10	HV16L10	HH4L10	HV4L10
VV133L15	HH16L15	HV16L15	HH4L15	HV4L15
VV133L20	HH16L20	HV16L20	HH4L20	HV4L20
VV133L25	HH16L25	HV16L25	HH4L25	HV4L25
VV133L35	HH16L35	HV16L35	HH4L35	HV4L35
VV133L40	HH16L40	HV16L40	HH4L40	HV4L40
VV133L45	HH16L45	HV16L45	HH4L45	HV4L45

HH475L5	HV475L5
HH475L10	HV475L10
HH475L15	HV475L15
HH475L20	HV475L20
HH475L25	HV475L25
HH475L35	HV475L35
HH475L40	HV475L40
HH475L45	HV475L45

Prefix: polarization type and frequency

HH16 horizontal transmit, horizontal receive; 1.6 Ghz

HV16 horizontal transmit, vertical receive; 1.6 Ghz

VV133 vertical transmit vertical receive; 13.3 Ghz

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Table 2A (cont'd)

HH4 horizontal transmit, horizontal receive; .4 Ghz
HV4 horizontal transmit, vertical receive; .4 Ghz
HH475 horizontal transmit, horizontal receive; 4.75 Ghz
HV475 horizontal transmit, vertical receive; 4.75 Ghz

Suffix: look angle from nadir - in degrees

Modular Multispectral Scanner

	lower	upper
MMS 4	.548	.583 μm
MMS 7	.662	.701
MMS 8	.703	.747
MMS 9	.770	.863
MMS 11	8.000	12.080

Passive Microwave Radiometer

MFMRHC	C band	Horizontal	polarization
MFMRHL	L band	Horizontal	polarization
MFMRVC	C band	Vertical	polarization

Barnes Prt 5

Table 2B

Dalhart Soil Moisture and Sensor Channel Variables

Volumetric Soil Moisture (%)

		upper depth	lower depth
SM02	FLD02	0 cm	2 cm
SM25	FLD25	2	5
SM515	FLD515	5	15
SM015	FLD015	0	15
SM1530	FLD1530	15	30
SM3045	FLD3045	30	45

SM(prefix)

FLD(prefix)

Scatterometers

Same sensors, angles, and labels as Guymon.

Thematic Mapper Simulator

Band	lower	upper
1	450	520 nm
2	520	600
3	630	690
4	760	900
5	1000	1300
6	1550	1750
7	2080	2350
8	1040	12,500

Passive Microwave Radiometer

Same as Guymon

2. Overview

This overview is arranged in four parts to show the effect of cover types. These include the raw data, correlation coefficients, single variable regressions, and stepwise regressions as derived from the highest correlating variables. A critical and intensive examination of all these preliminary reports remains to be done.

2.1 Cover Type Comparisons

A large number of variables are being compared in this analysis. Explication of the effects of single variable changes in the analysis is complicated by the fact that comparisons of sensor types and responses contain the convolved effects of multi-variable changes soil moisture profiles, cover types and soil textures. In some instances, the effect of a single variable change is approximated via the regression equations.

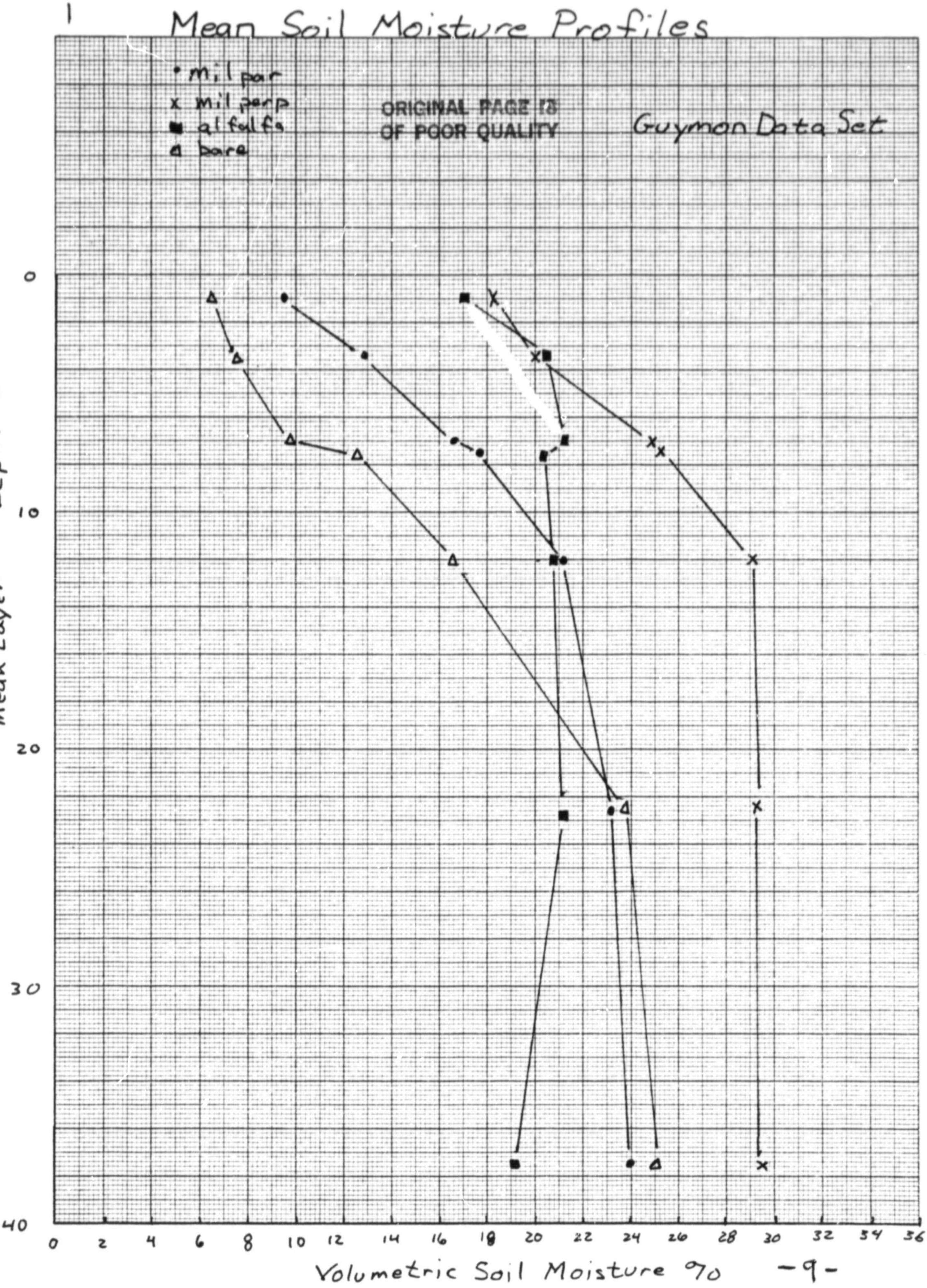
2.1.1 Raw Data

Consider first that determining the effects of cover types is difficult due to the fact that the sets of fields have significantly different moisture profiles. Figures 1 and 2 show the mean values of each layer plotted at the mean depth of each soil sample layer. Thus the mean scattering cross sections, Figures 3 and 4, incorporate these effects as do the plan view direction modulation for the milo fields (viewed parallel or perpendicular to the rows), in Figure 3E.

Soil textures also differ from field to field. Tables 3 and 4 briefly show the variation in textures of the sampled fields. Lees (1981) discussed the analysis of the soil texture vs soil moisture of the Guymon and Dalhart data sets, therefore these tables have been included here for comparison only.

Noteworthy is relatively smaller excursions in mean scattering cross-section of the MV 1.6 Ghz sensor (compared to all other sensors and polarizations) as look angle is varied. This is particularly evident in the Guymon data sets for all cover types (Figures 3A - 3D). It is significantly less evident in the Dalhart data sets (Figures 4A - 4D).

Fig 1



Mean Soil Moisture Profiles
• mil par
x mil perp
■ alfalfa
Δ bare
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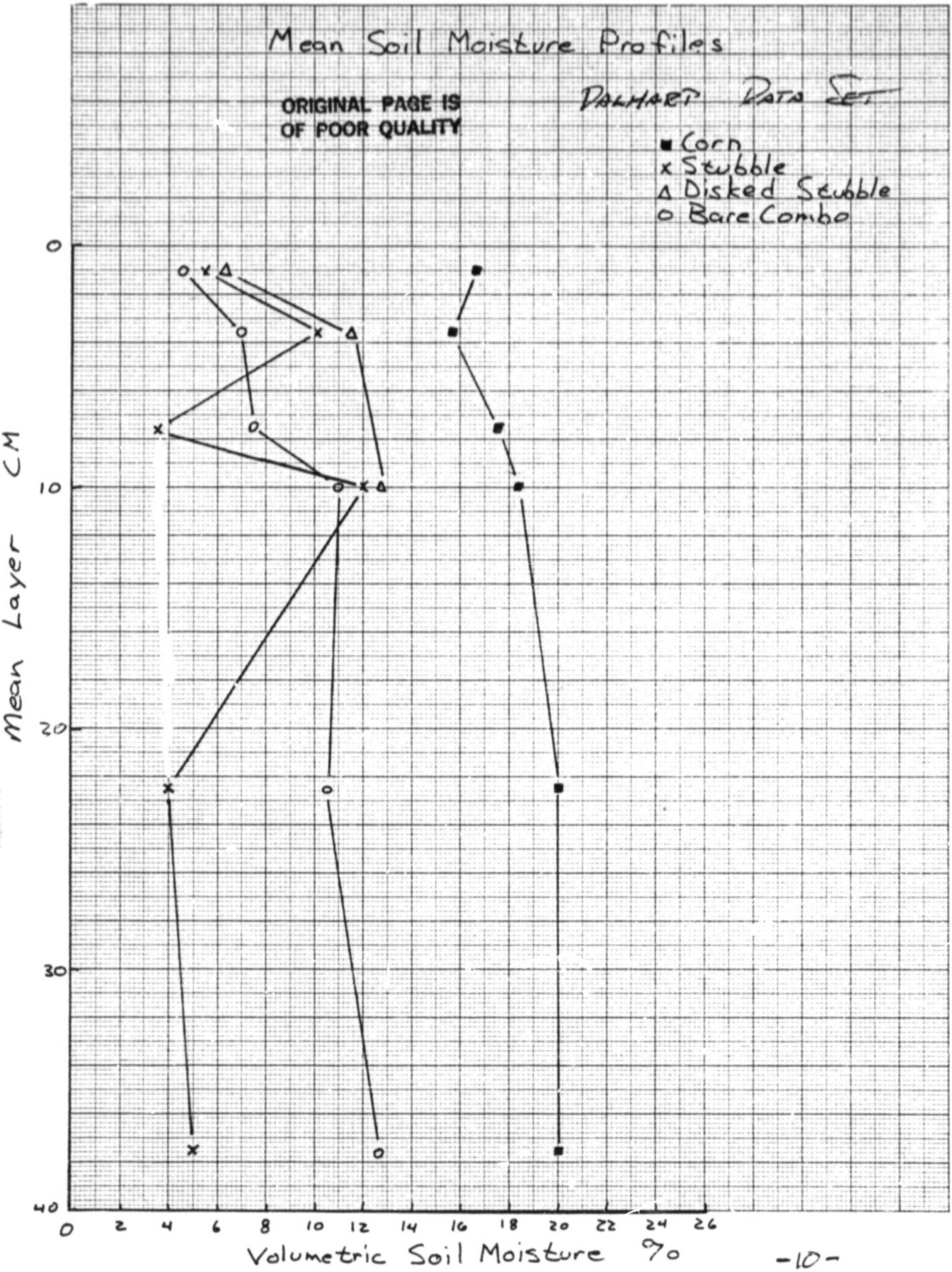
Guymon Data Set
Mean Layer Depth CM
0
10
20
30
40
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
Volumetric Soil Moisture %

Fig 2



Mean Soil Moisture Profiles
Dalhart Data Set
■ Corn
x Stubble
Δ Disked Stubble
o Bare Combo
Mean Layer CM
0
10
20
30
40
0 2 4 6 8 10 12 14 16 18 20 22 24 26
Volumetric Soil Moisture %

Fig. 3A

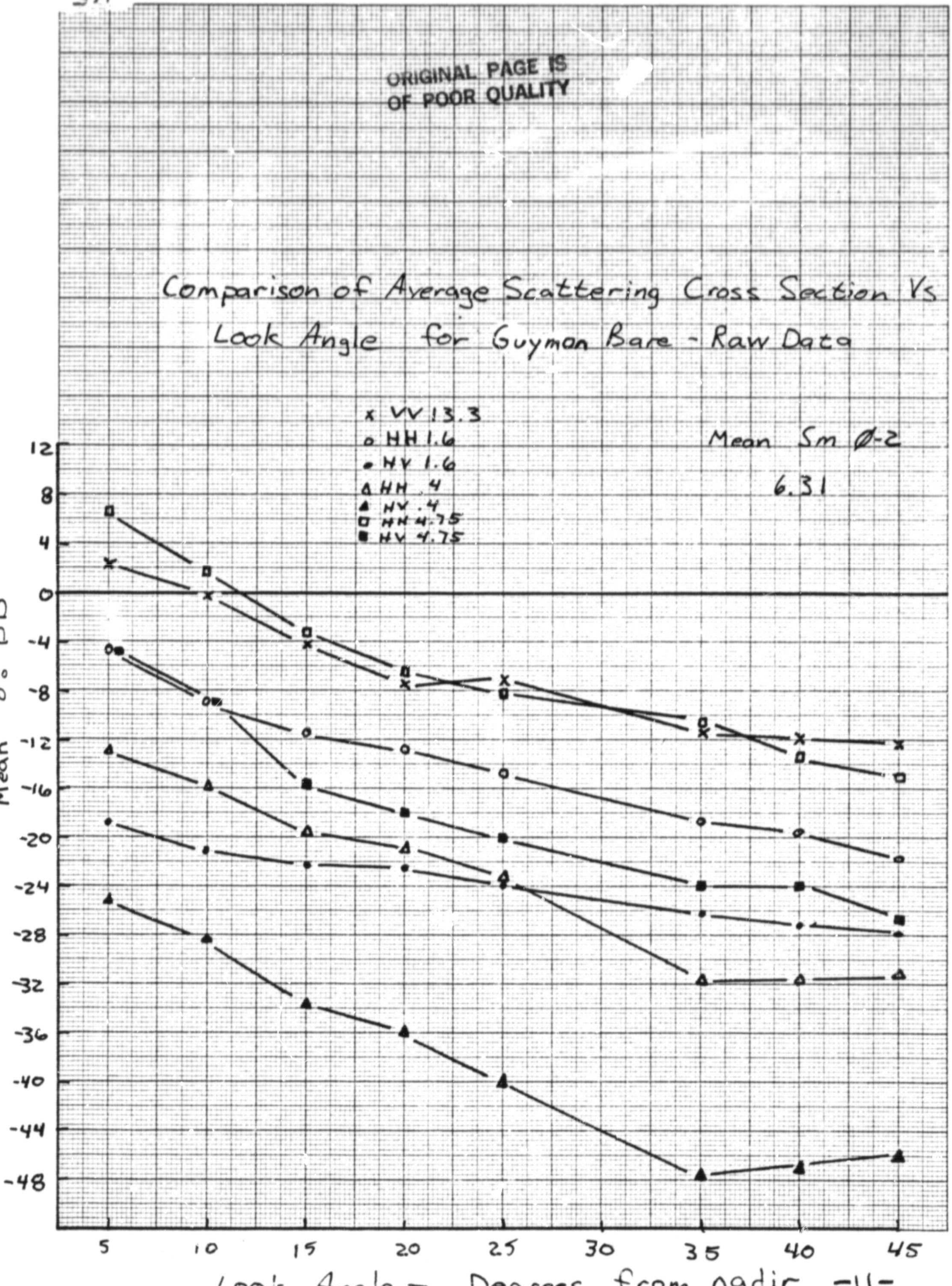

Comparison of Average Scattering Cross Section Vs
Look Angle for Guyman Bare - Raw Data
x VV 13.3
o HH 1.6
• HV 1.6
△ HH .4
▲ HV .4
□ HH 4.75
■ HV 4.75
Mean Sm Ø-2
6.31
Mean σ° DB
12
8
4
0
-4
-8
-12
-16
-20
-24
-28
-32
-36
-40
-44
-48
5
10
15
20
25
30
35
40
45
Look Angle - Degrees from nadir

Fig. 3B

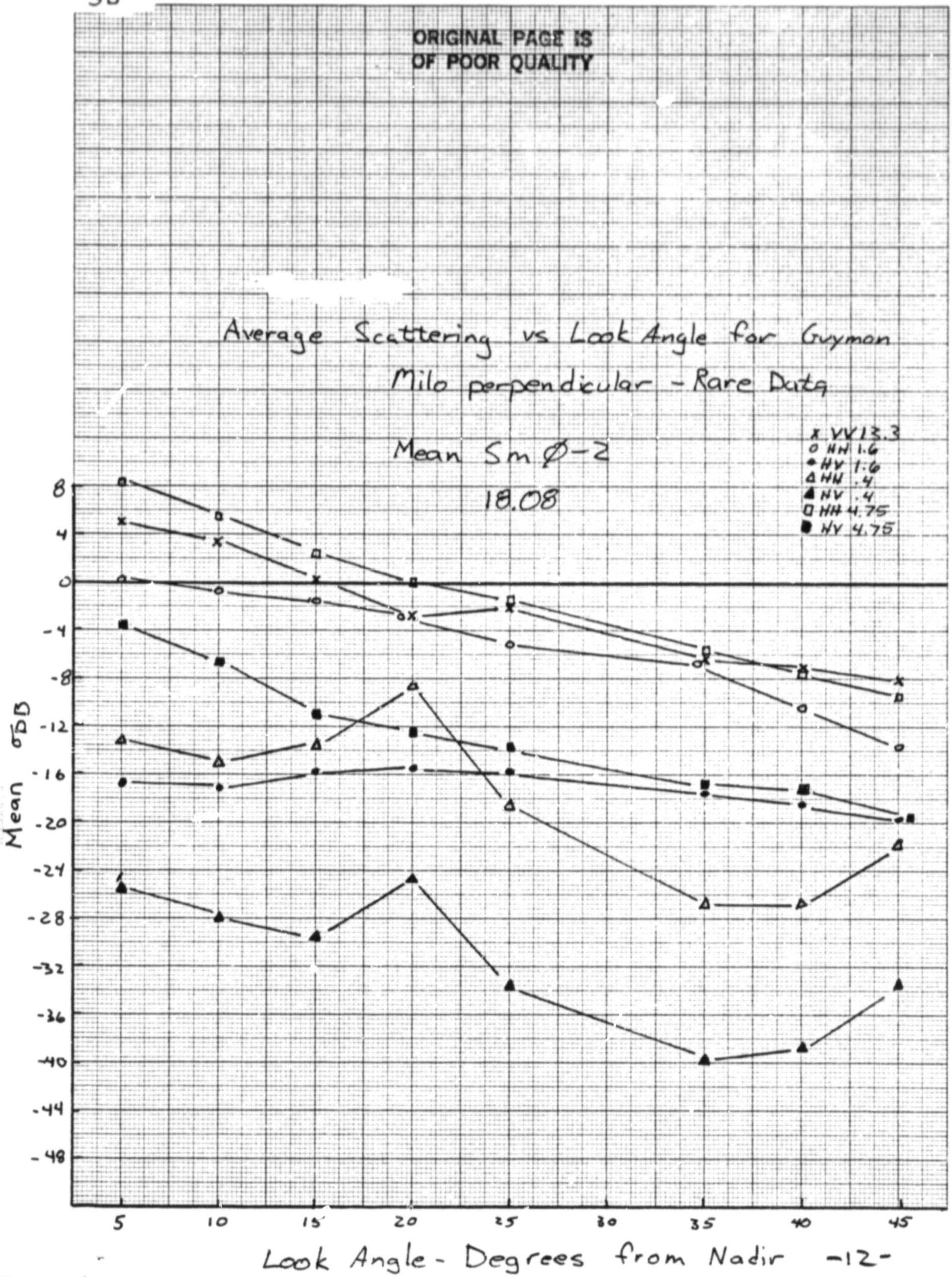

Average Scattering vs Look Angle for Guymon
Milo perpendicular - Rare Data
Mean Sm Ø-2
18.08
x VV 13.3
o HH 1.6
• HV 1.6
Δ HH .4
▲ HV .4
□ HH 4.75
■ HV 4.75
Mean σDB
8
4
0
-4
-8
-12
-16
-20
-24
-28
-32
-36
-40
-44
-48
5
10
15
20
25
30
35
40
45
Look Angle - Degrees from Nadir

Fig 3C

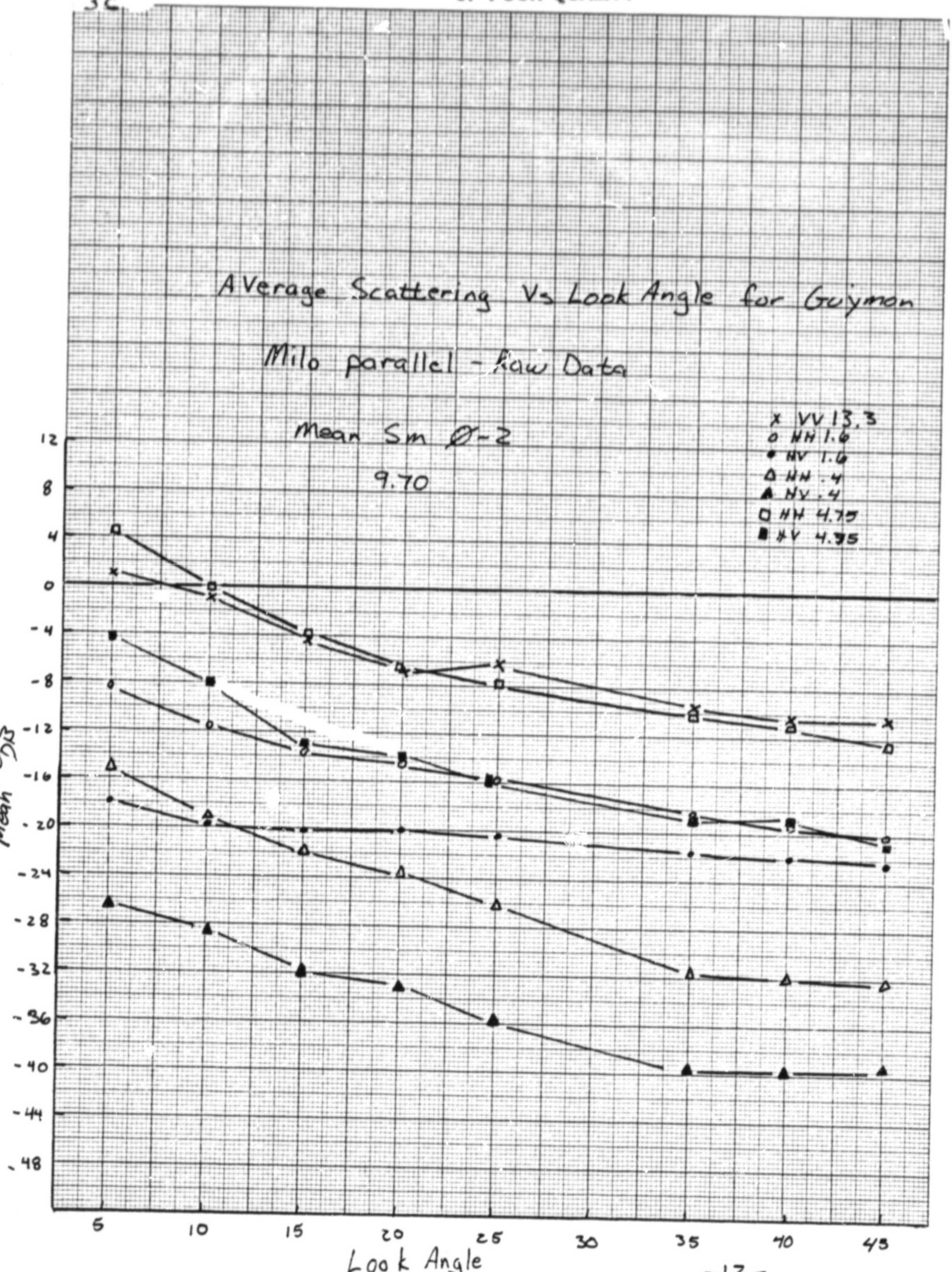

Average Scattering Vs Look Angle for Guymon
Milo parallel - Raw Data
Mean Sm Ø-2
9.70
x VV 13.3
o HH 1.6
• HV 1.6
Δ HH .4
▲ HV .4
□ HH 4.75
■ HV 4.75
12
8
4
0
-4
-8
-12
-16
-20
-24
-28
-32
-36
-40
-44
-48
Mean σ°dB
5
10
15
20
25
30
35
40
45
Look Angle

Fig. 3d

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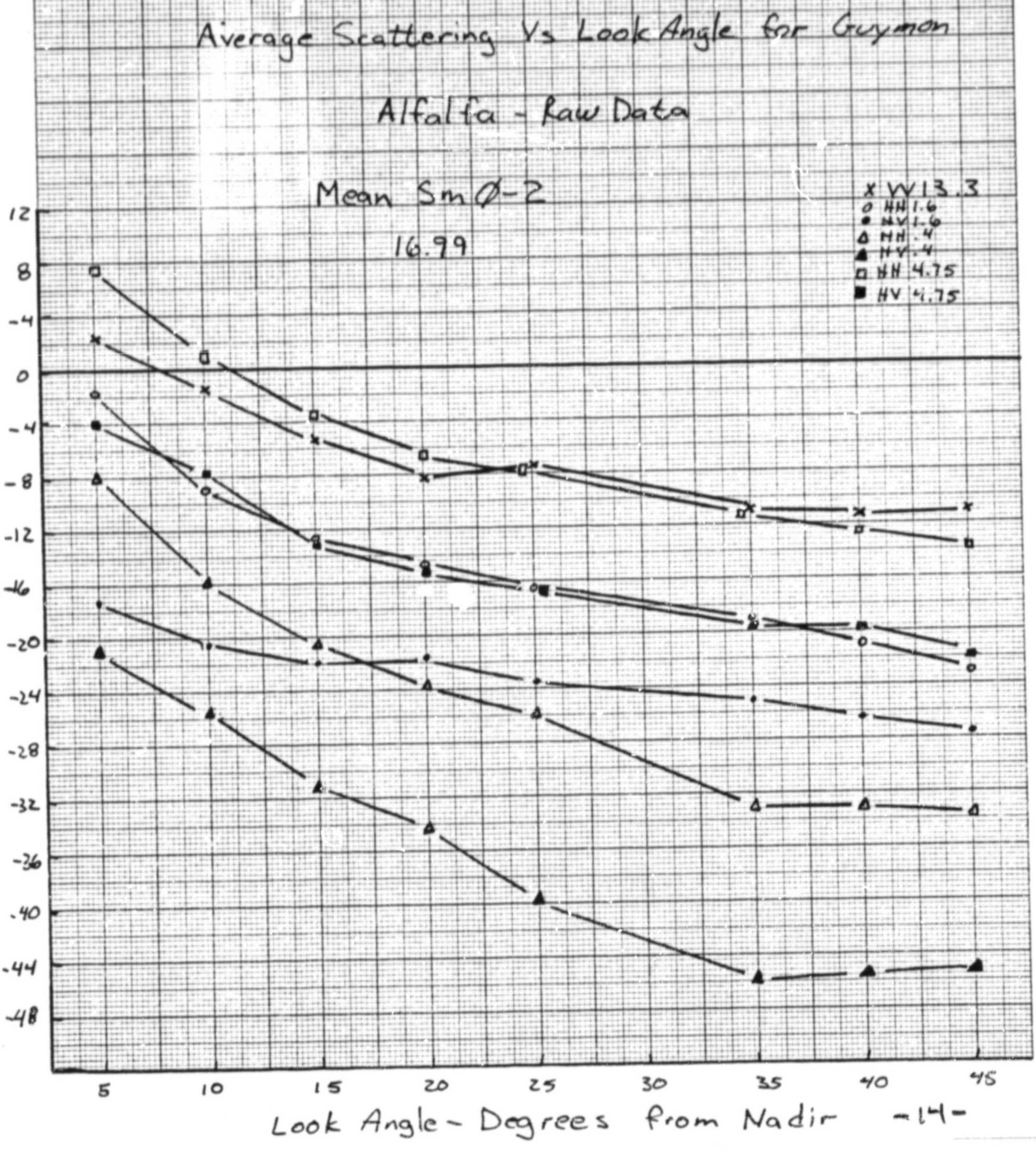

Fig 3E

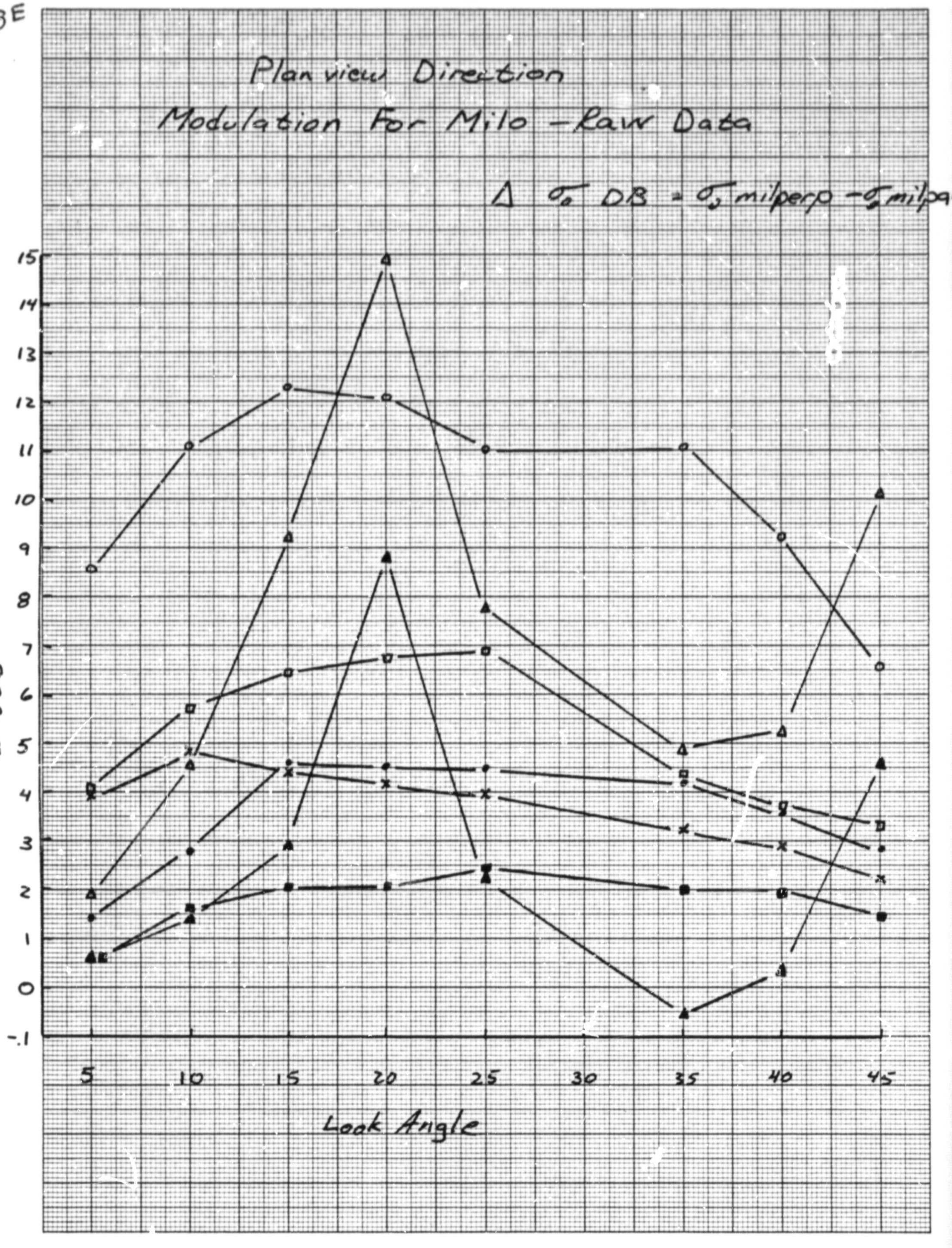
Planview Direction
Modulation For Milo - Raw Data
Δ σo DB = σo milperp - σo milpar
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
-.1
Δ σo DB
5
10
15
20
25
30
35
40
45
Look Angle

Fig 4A

Comparison of Average Scattering Cross Section Vs Look Angle for Dalhart Bare Combo

-Raw Data-

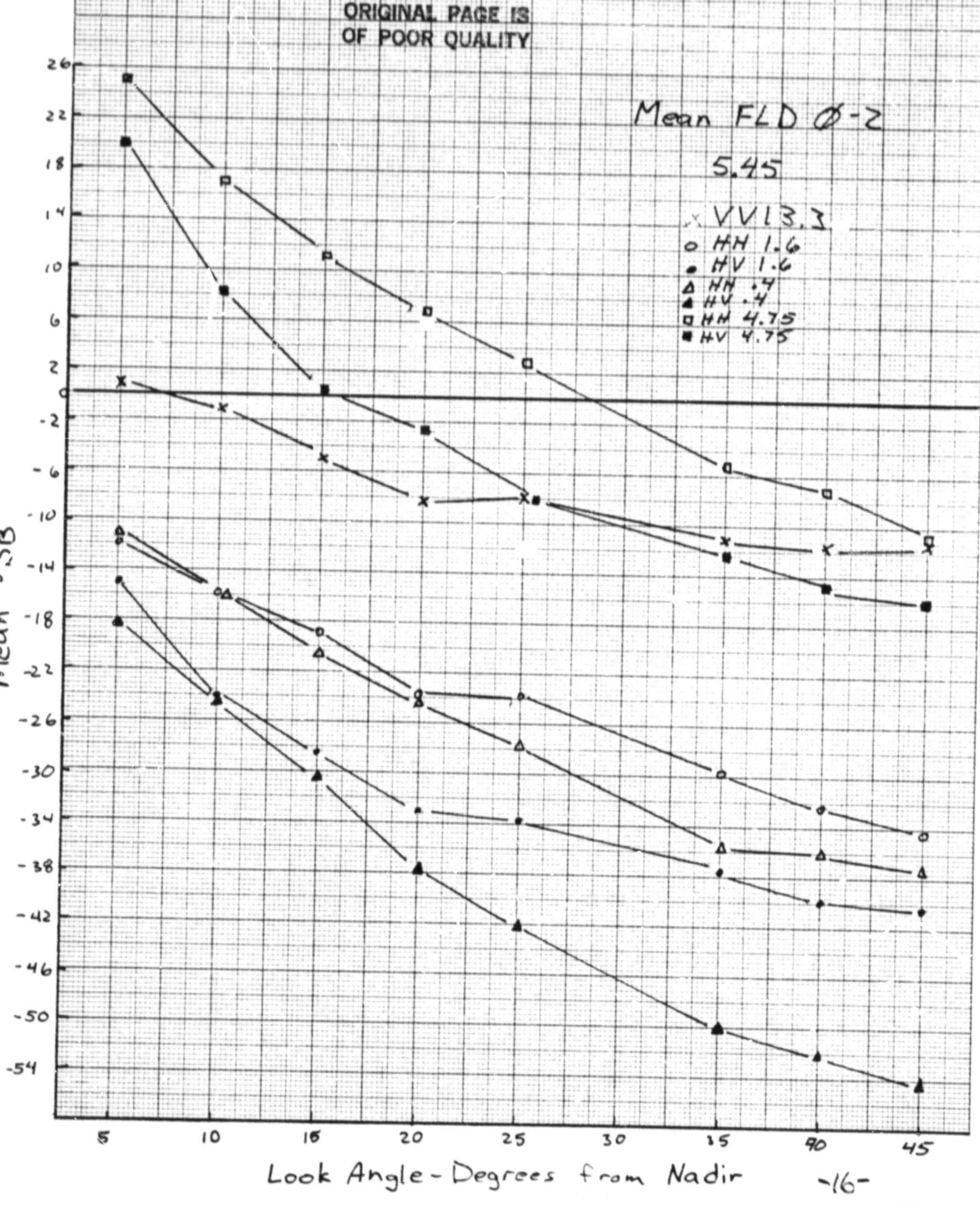

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Fig 1B

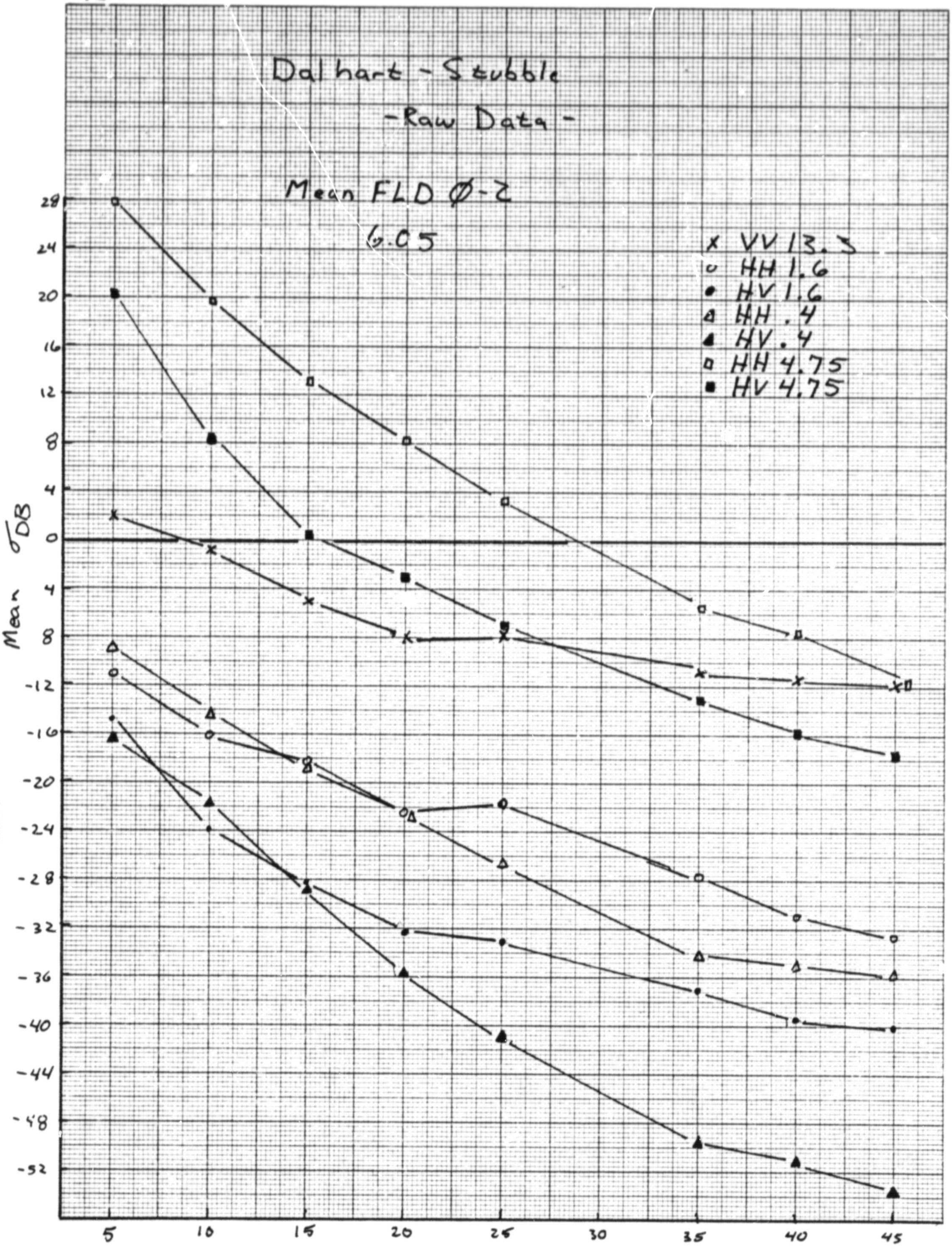

Fig 4C

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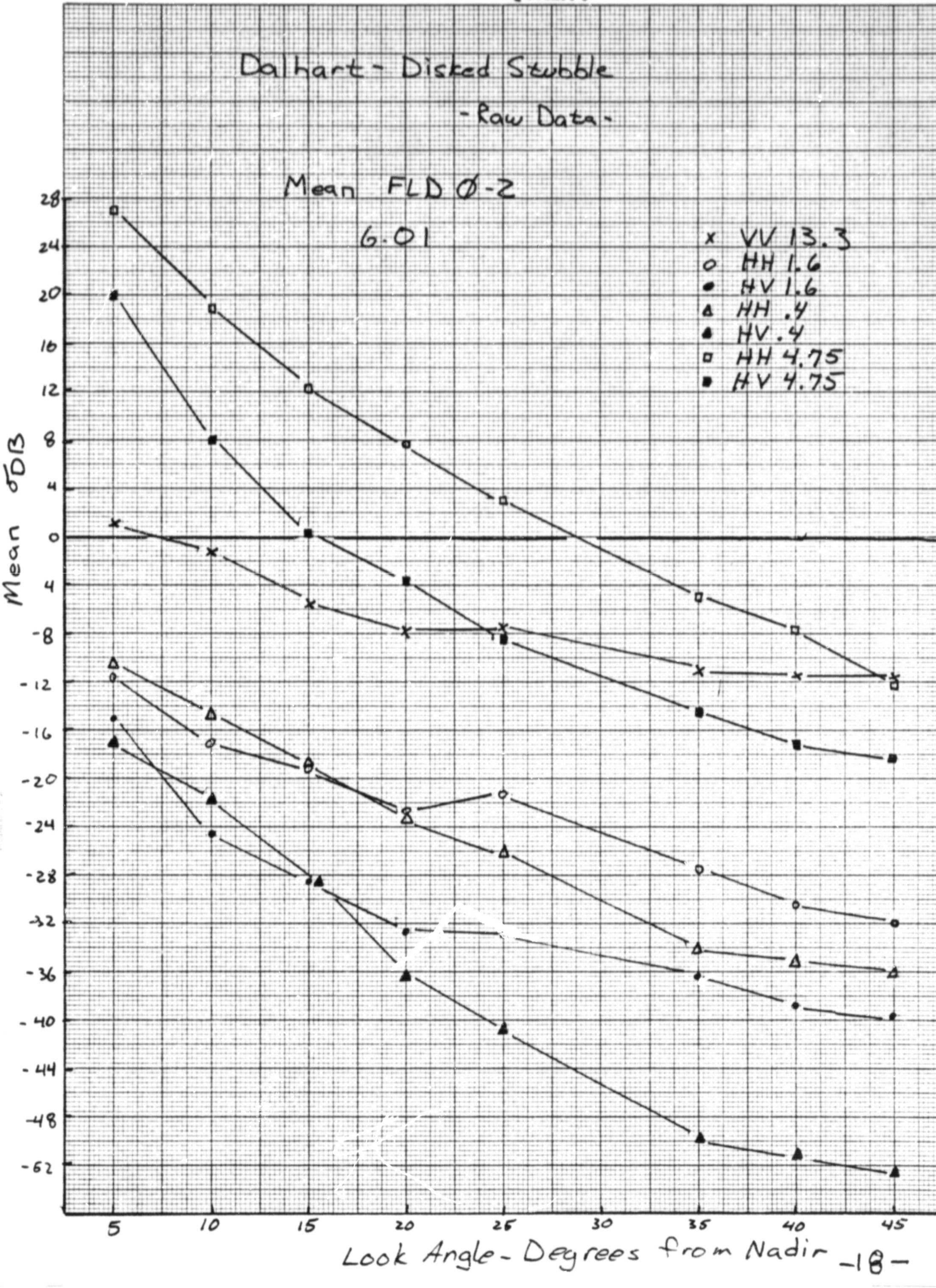

Fig 4D

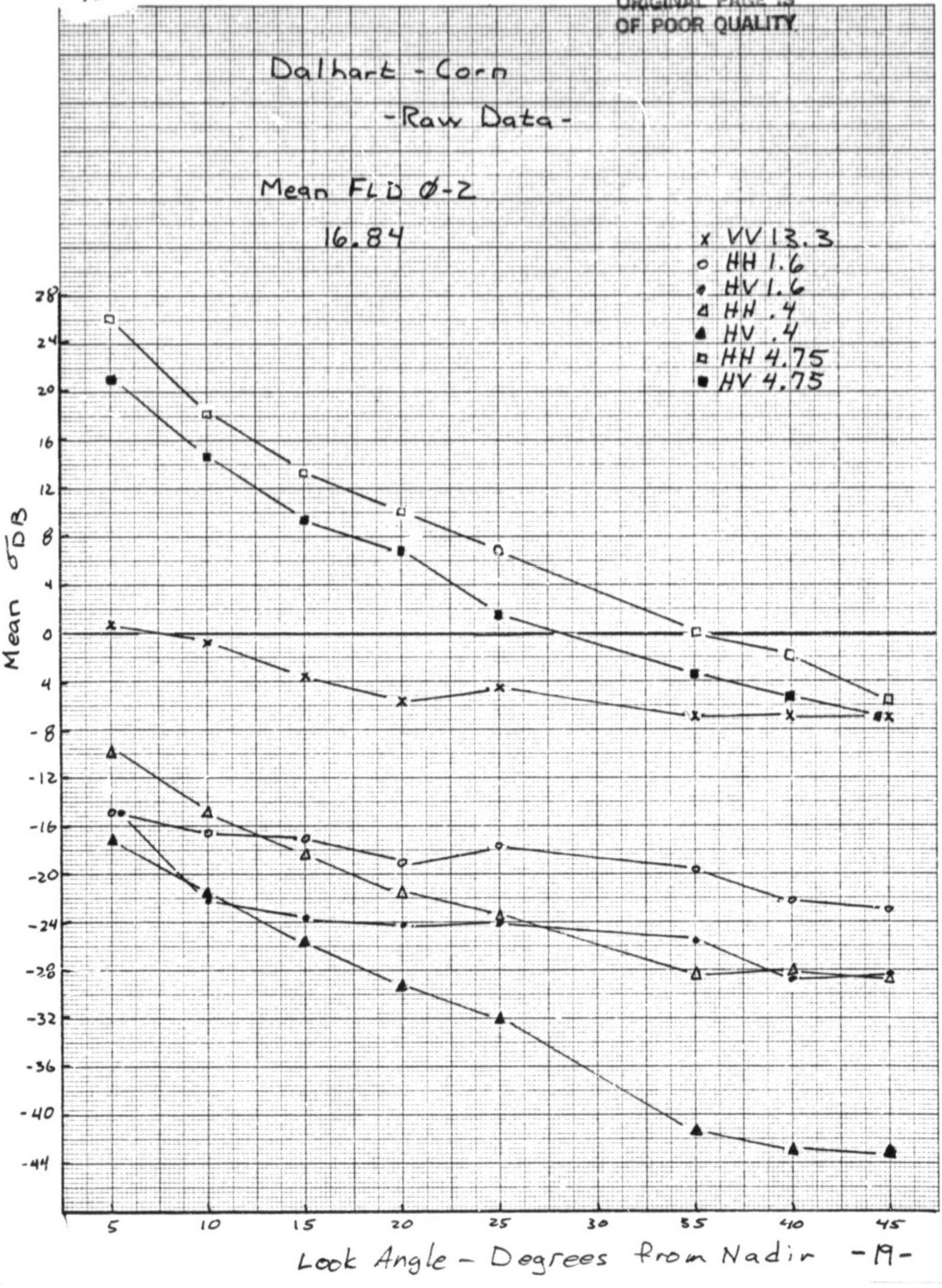
Dalhart - Corn
-Raw Data-
Mean FLD Ø-2
16.84
x VV 13.3
o HH 1.6
• HV 1.6
△ HH .4
▲ HV .4
□ HH 4.75
■ HV 4.75
Mean σ DB
28
24
20
16
12
8
4
0
4
-8
-12
-16
-20
-24
-28
-32
-36
-40
-44
5
10
15
20
25
30
35
40
45
Look Angle - Degrees from Nadir

Table 3

DEPTH 0 - 2 cm.

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	FLD	% SAND	[illegible]	[illegible]	WP
2	L 1A	17.0	39.5	• 0.4584	0.2467
2	L 1X R	9.5	42.5	• 0.4906	0.2659
1	B 2	28.2	31.6	0.3931	0.2016
2	L 2A	15.0	41.6	• 0.4735	0.2581
1	B 2X	8.5	42.4	0.4924	0.2661
4	A 4	39.0	25.6	0.3383	0.1659
1	B 6	28.5	33.2	0.4004	0.2091
2	L 7	21.4	40.4	• 0.4528	0.2482
2	L 8	33.4	36.5	• 0.4057	0.2218
1	B 10	25.0	33.6	0.4105	0.2133
4	A 13	28.2	32.6	0.3981	0.2064
1	B 14	43.3	27.7	0.3389	0.1732
2	L 15	29.0	32.6	• 0.3963	0.2059
1	B 17	20.2	42.4	0.4655	0.2586
3	R 19	31.5	38.0	0.4175	0.2302
3	R 20	30.0	34.1	0.4015	0.2125
1	B 21	32.5	34.7	0.3988	0.2138
4	A 22	34.5	31.5	0.3781	0.1971
3	R 24	22.0	44.7	0.4729	0.2685
3	R 25	21.5	52.3	0.5120	0.3053
1	B 26	22.0	44.5	0.4719	0.2675
4	A 27	31.0	31.5	0.3862	0.1994

Table 4

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DALHART
FIELD CAPACITY VALUES

SAMPLE NUMBER	% SAND	% CLAY	FC	WP
1	79.0	17.0	[illegible]	0.0990
2	73.0	20.0	0.2321	0.1173
3	81.0	15.0	0.1887	0.0882
4	80.0	16.0	0.1960	0.0936
5	76.0	16.0	0.2052	0.0962
6	72.0	22.0	0.2444	0.1275
F5	73.0	18.0	0.2221	0.1077
F6	71.0	17.0	0.2217	0.1042
AV	76.8	17.7	0.2119	0.1038

[illegible] TIME
[illegible] WRITES
[illegible] WRITES

8/20/81

2.1.2 Correlation Coefficients

The effects of scatterometer look angle, frequency, and polarization on correlation with volumetric soil moisture in the 0-2 cm layer is shown in Figures 5 and 8. Significant is the relatively constant correlation of the HV 1.6 Ghz sensor channel for look angles of $\geq 10^{0}$ in the Guymon bare field data set. In comparison the HV 4.75 Ghz channel for look angles of $\geq 10^{0}$ in the Dalhart bare field data set has relatively constant but lower correlation coefficients. For the latter set the HH 4.75 Ghz shows no correlation.

Note also the great disparity in the correlation results of the .4 Ghz HH and HV sensor. The Guymon bare field data shows increasing negative correlations for the HH polarization (with increasing look angle) and essentially no correlation for the HV data. In contrast, the .4 Ghz HV sensor ranks as one of the highest in (somewhat constant) correlation for the Dalhart bare (combo) field data. The .4 Ghz HH data shows a similar and somewhat lower correlation trend. These discrepancies have not been explained.

Throughout the data analysis relatively little difference in results were found in comparisons of the field average (FLD) vs line (SM) soil moisture sets - most analysis results are also similar to those reported last year prior to later data editing (Hajic, 1981).

Figures 6 and 9 show correlations with passive microwave sensors. Figure 7 similarly shows the correlations for the Modular Multispectral Scanner (Guymon) and Figure 10 for the Thematic Mapper Simulator (Dalhart).

A comparison of the coefficients of correlation of the sensor responses with the volumetric soil moisture measured at progressively deeper layers is shown in Figures 11, 12, 13, and 14. The depth is plotted at the midway point for the layers 0-2, 2-5, 5-9, and 9-15 cm for Guymon with 0-2, 2-5,

and 9-15 cm for Dalhart. As a reference, the correlation of the soil moisture at each depth with that in the top 0-2 cm is shown. Since the latter is shown to remain relatively high and almost constant for all cover types, except bare, no conclusions can be readily reached regarding the distribution of depth to the sensor response. The generally high correlating scatterometer look angles of less than 25 degrees are shown. This is to show the significant effect of a relatively small change in look angle on the correlation.

Fig 5A Correlation of SMØ2 and Scatt Look Angle

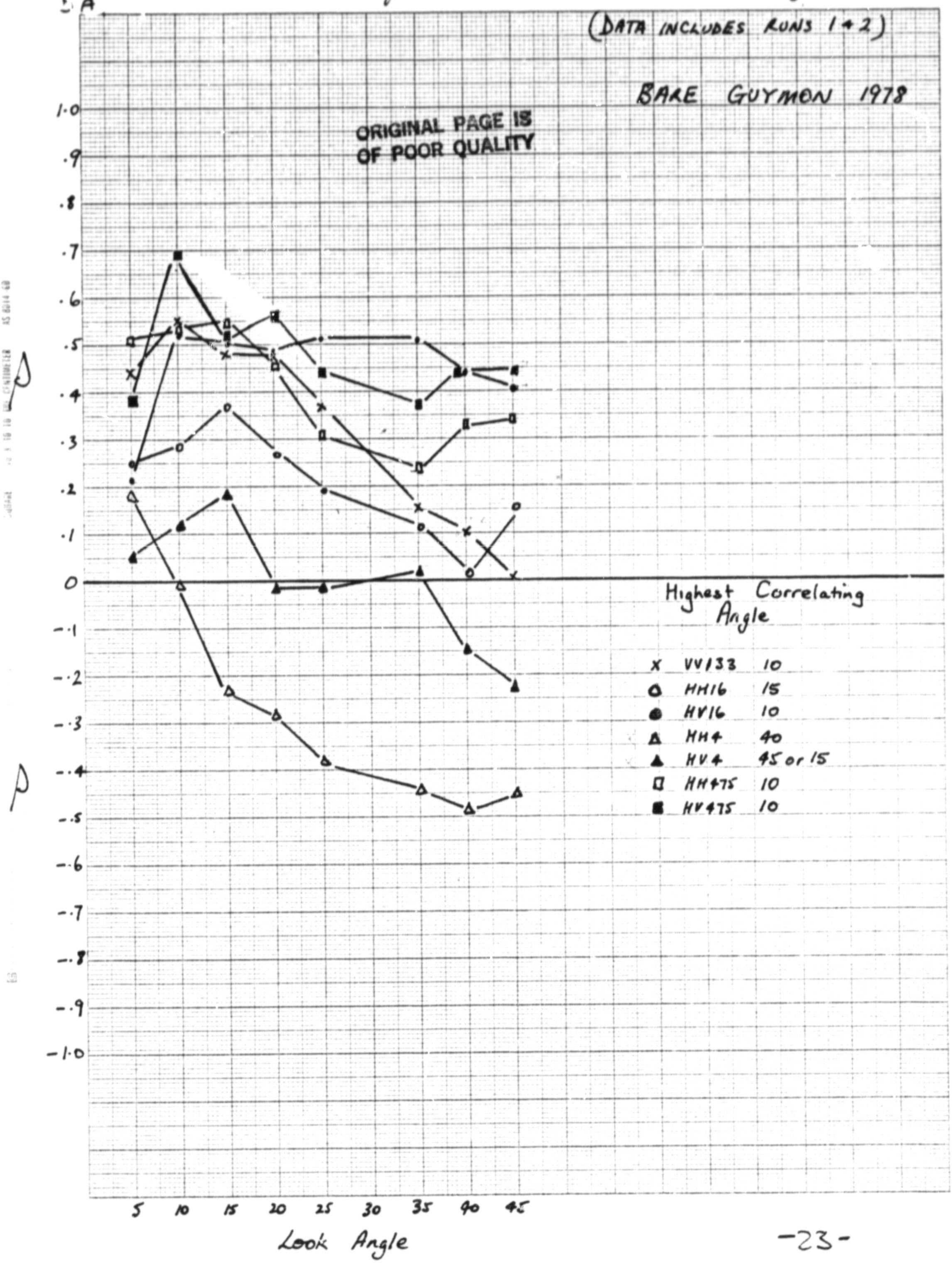
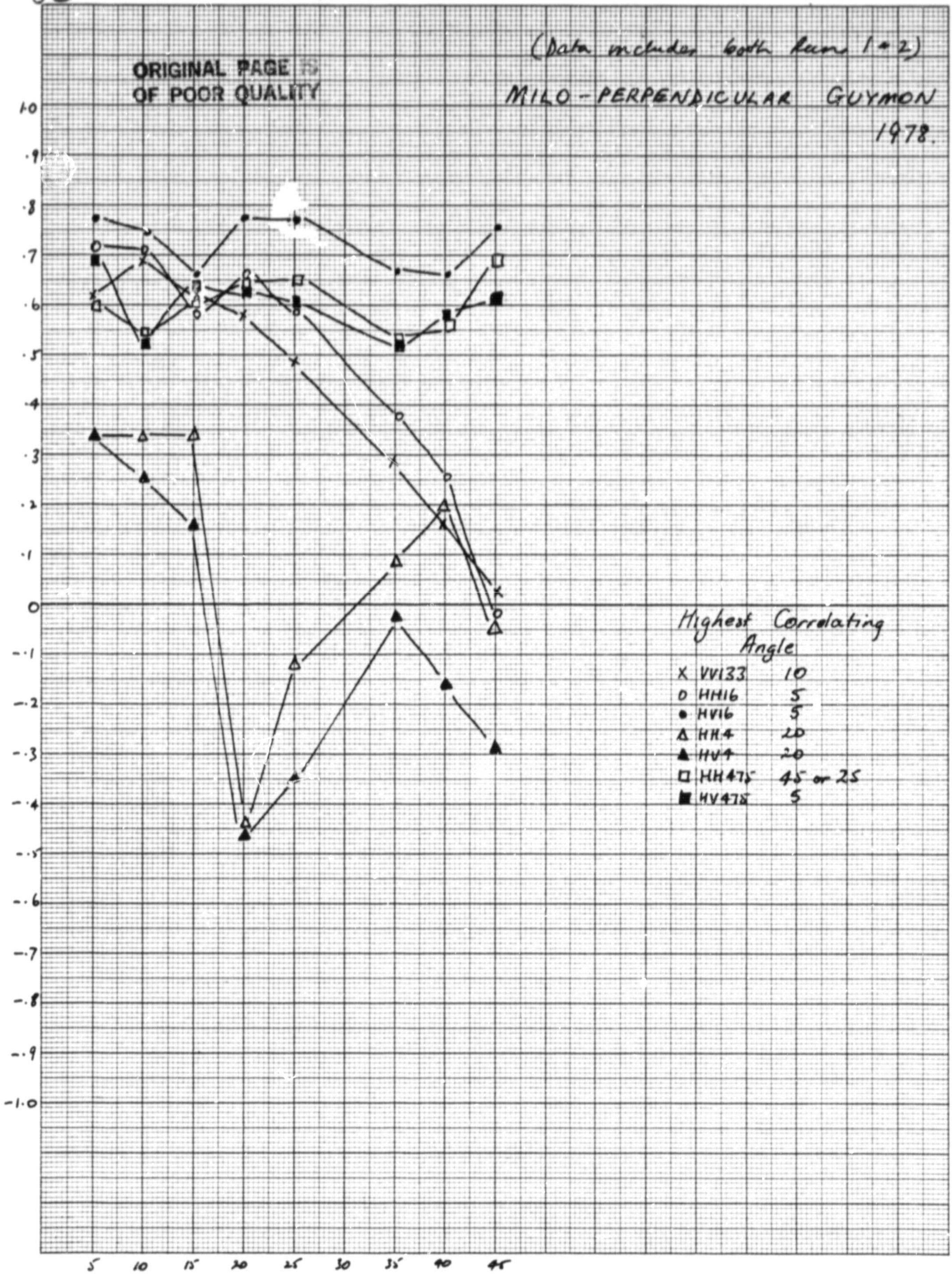


Fig 5B Correlation of SMØ2 and Scatt Look Angle



Look Angle

Fig 5C Correlation of SMØ2 and Scatt Look Angle

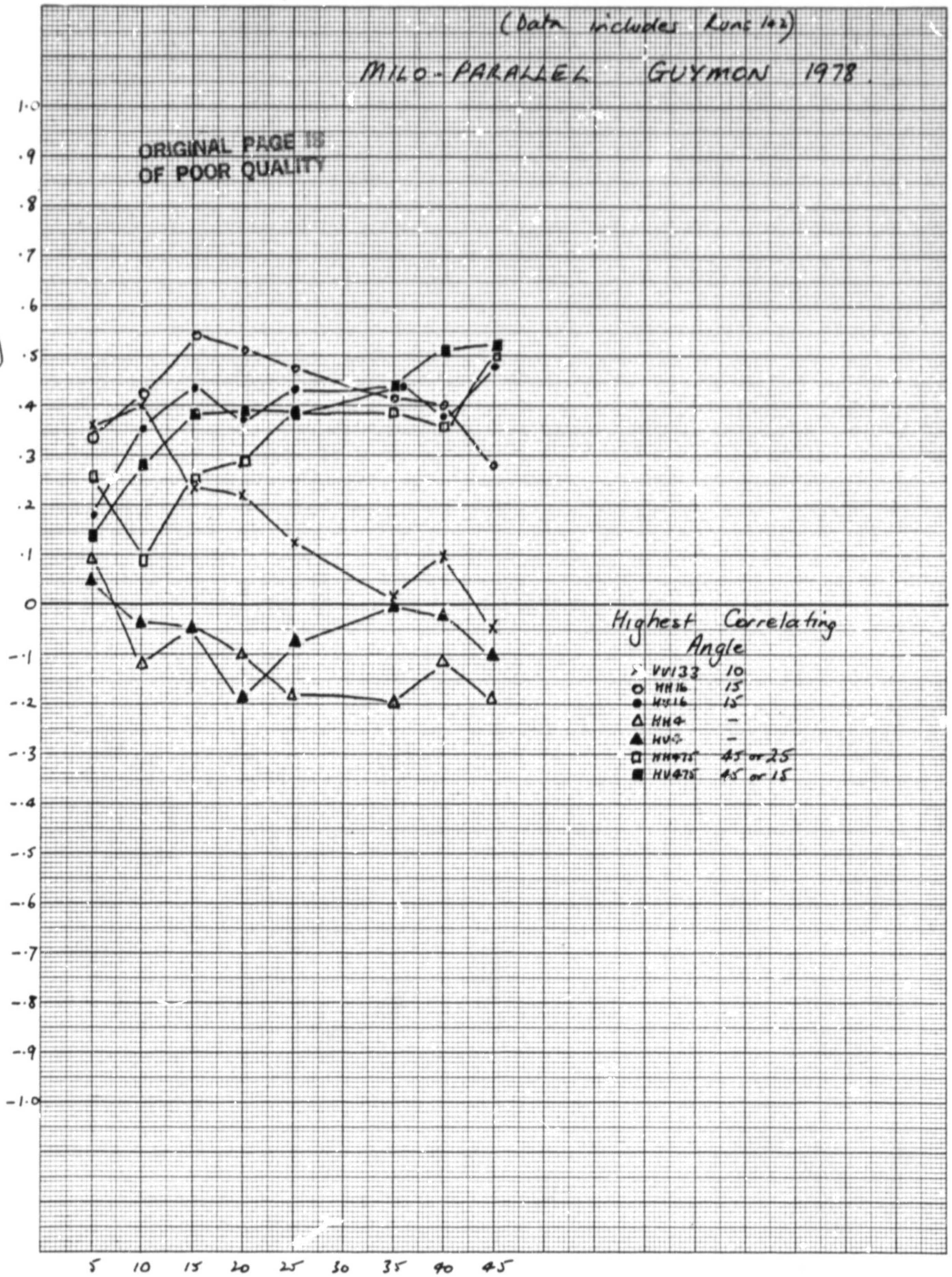


Fig 5D Correlation of SMØ2 and Scatt Look Angle.

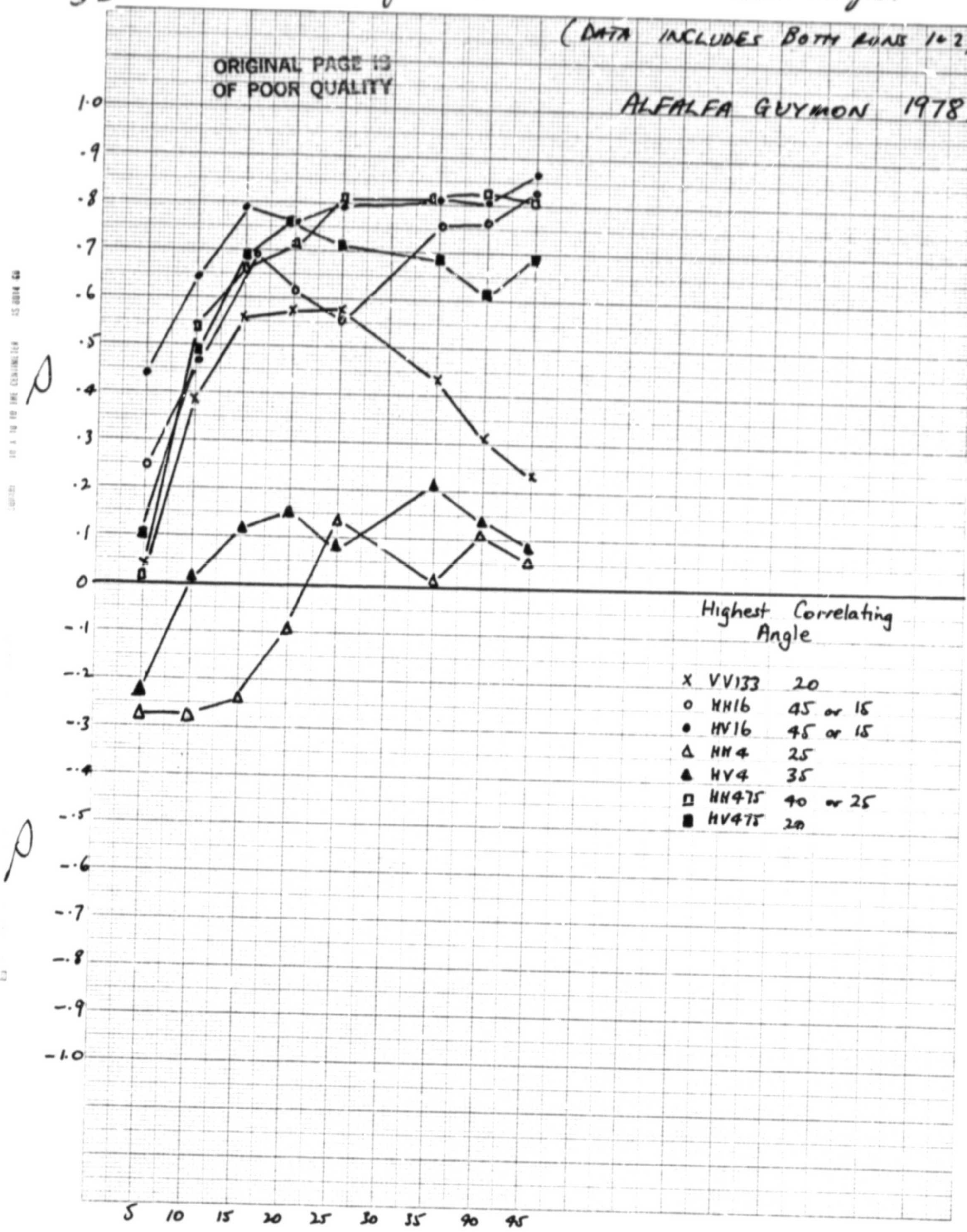


Fig 6

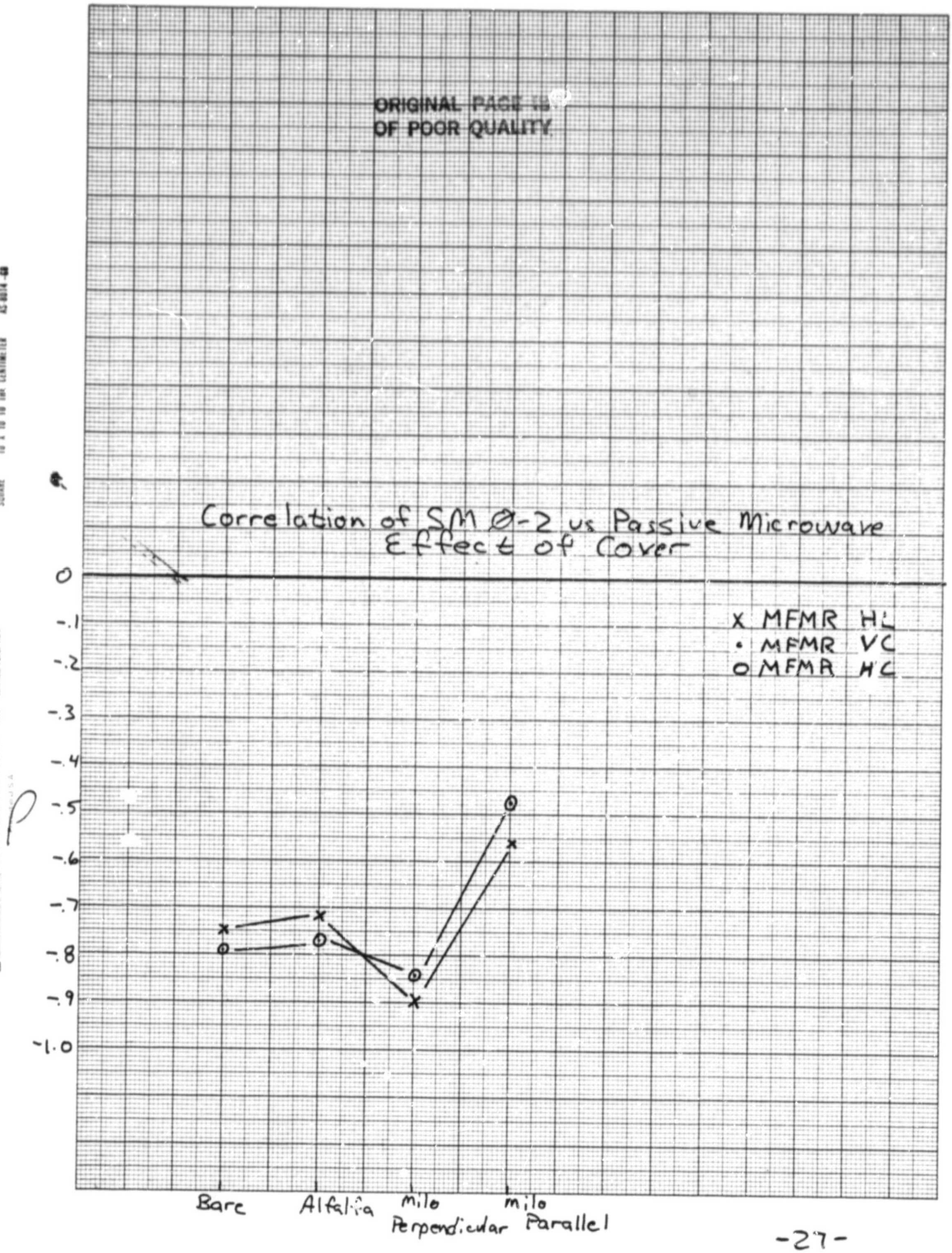

Correlation of SM 0-2 vs Passive Microwave
Effect of Cover
0
-.1
-.2
-.3
-.4
-.5
-.6
-.7
-.8
-.9
-1.0
ρ
X MFMR HL
• MFMR VC
O MFMR HC
Bare
Alfalfa
milo
Perpendicular
milo
Parallel

Fig 7 Correlation of SM Ø-2 vs M.M.S.

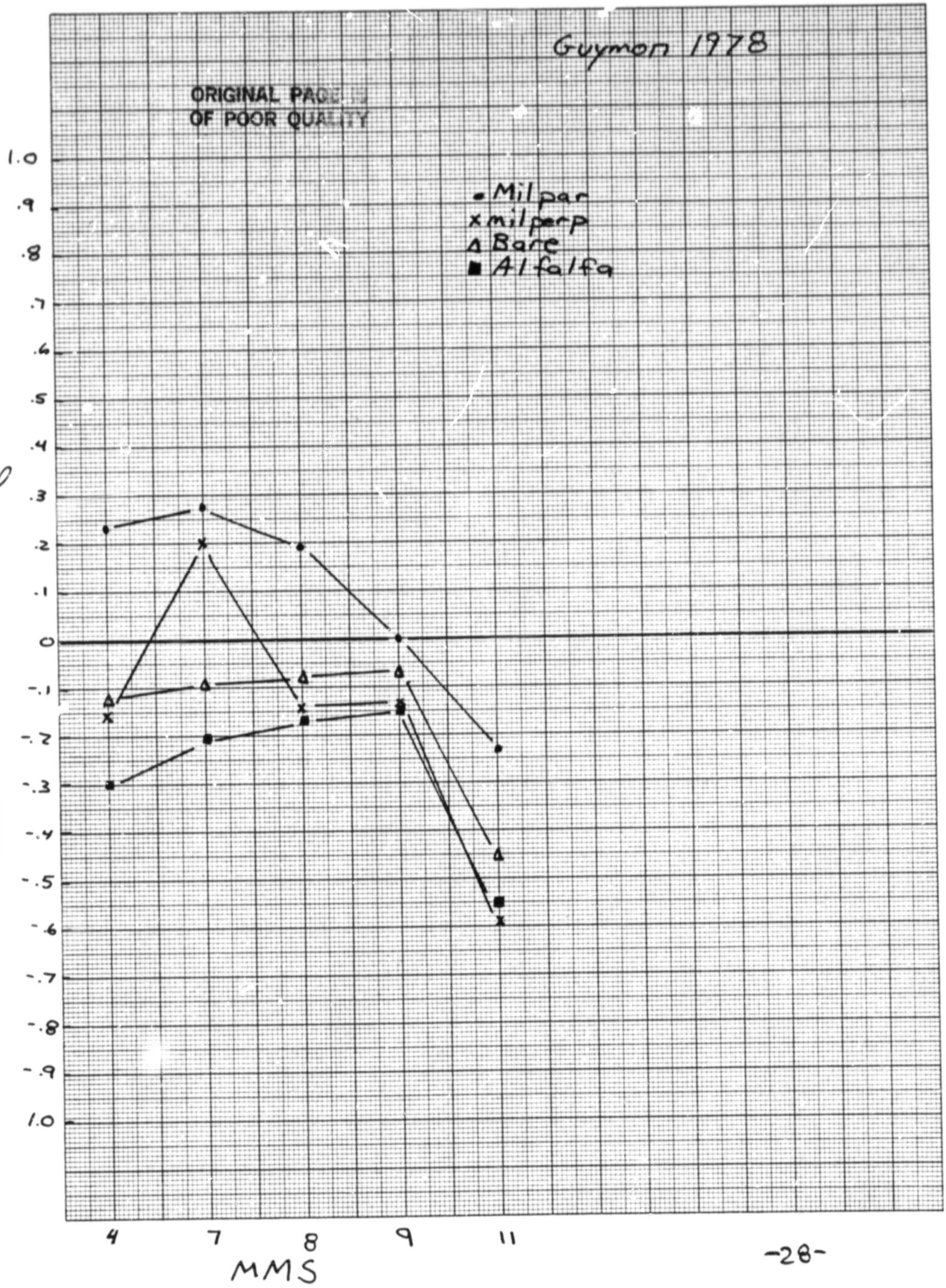


Fig 8A Correlation of FLD Ø-2 Vs Scatt Look Angle

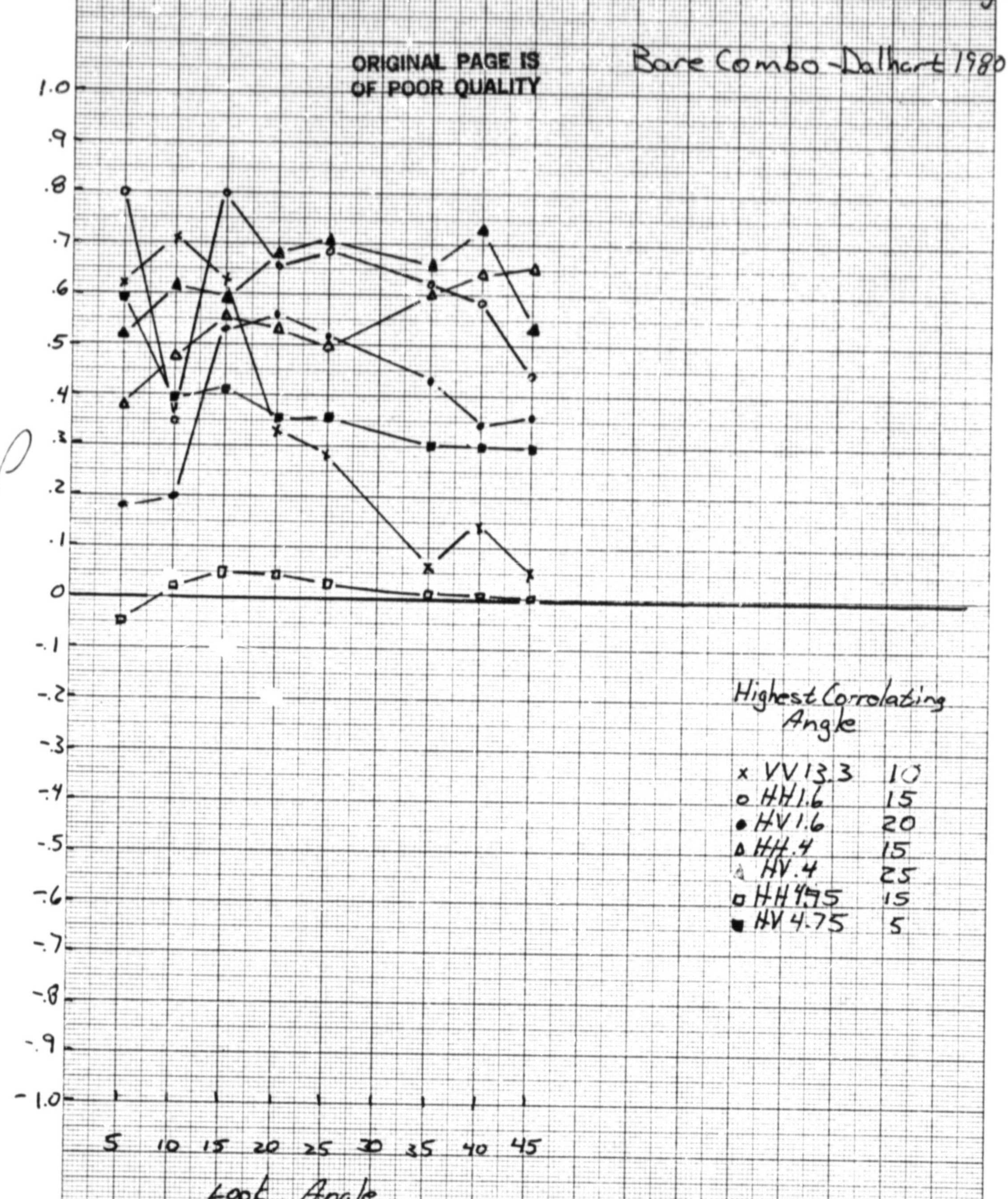
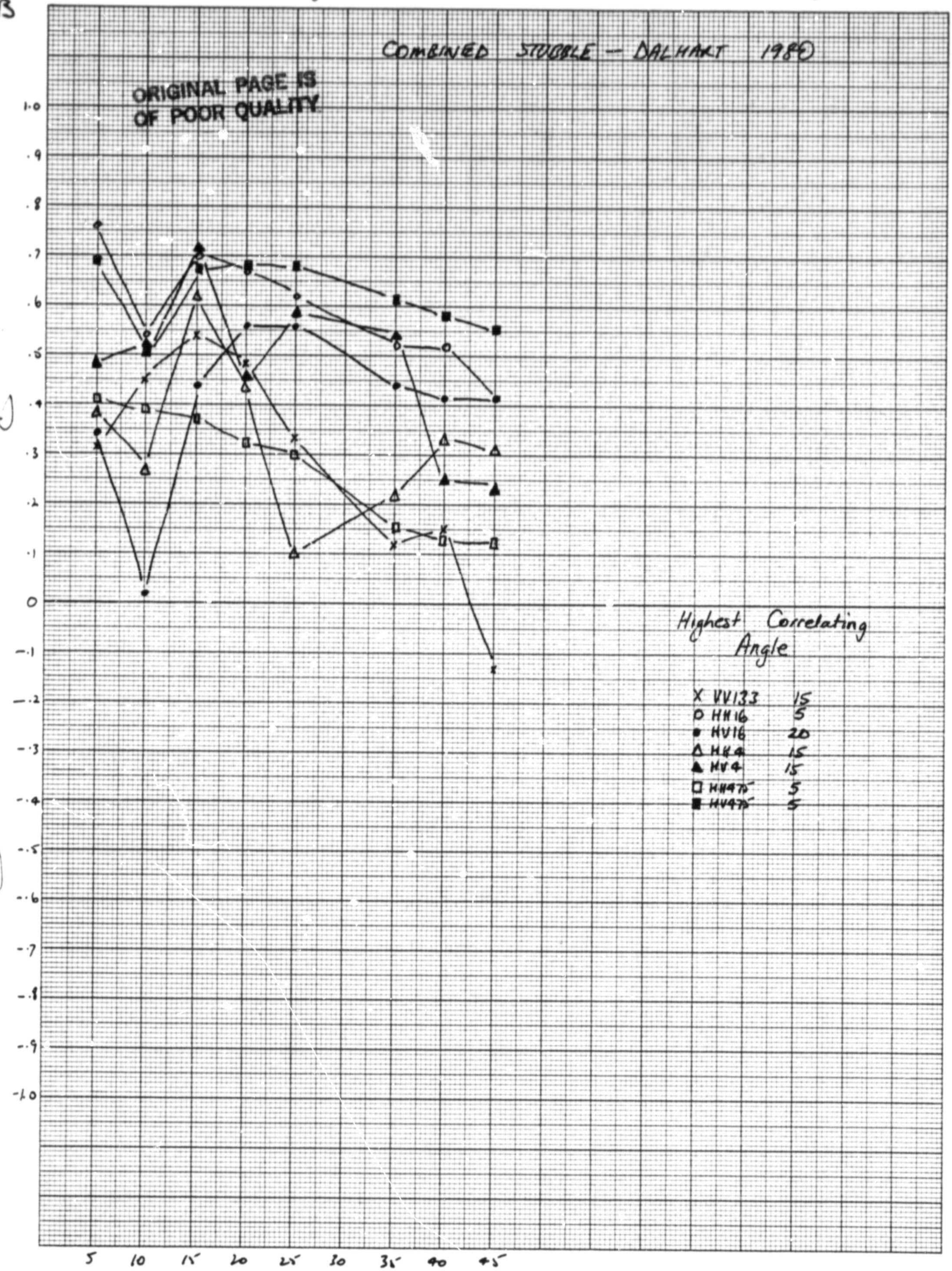
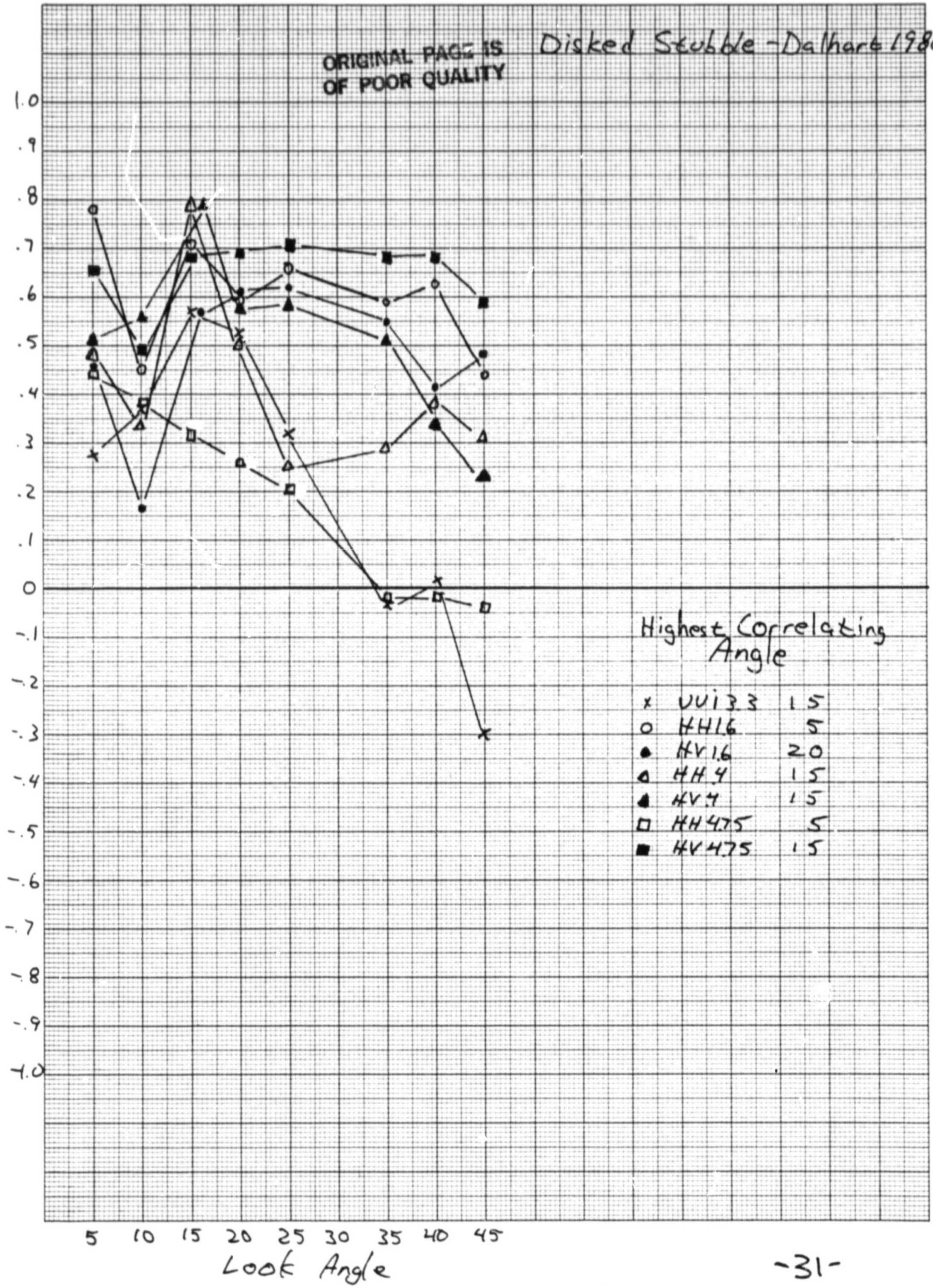


Fig 8B Correlation of FLDØ-2 and Scatt Look Angle.



Correlation of FLD Ø-2 vs Scatt Look Angle

Fig 8C



Correlation of FLD Ø-Z vs Scatt Look Angle

Fig 8E

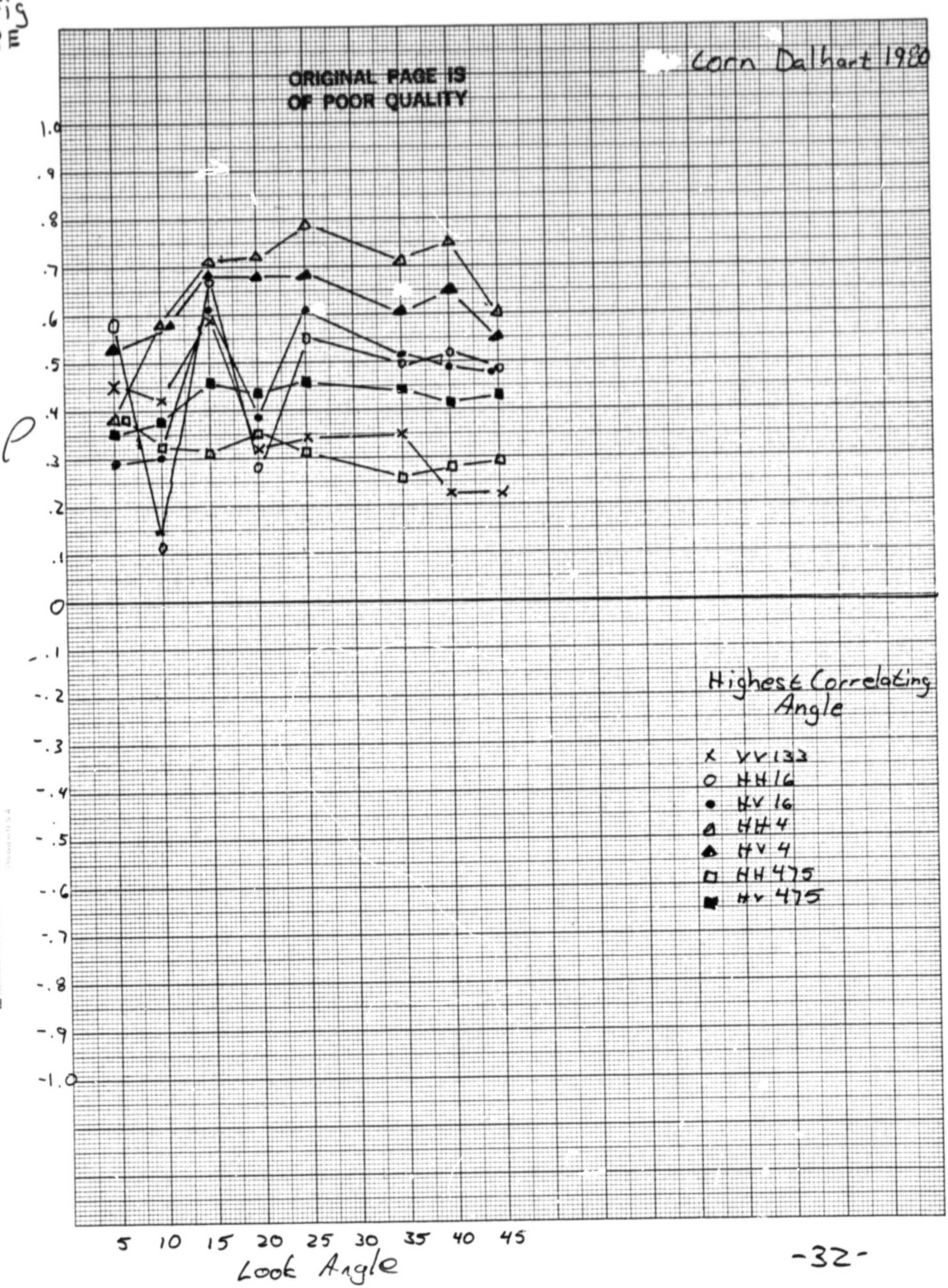


Fig 9

Correlation of FLD ϕ-2 vs Passive Microwave

Effect of Cover Type

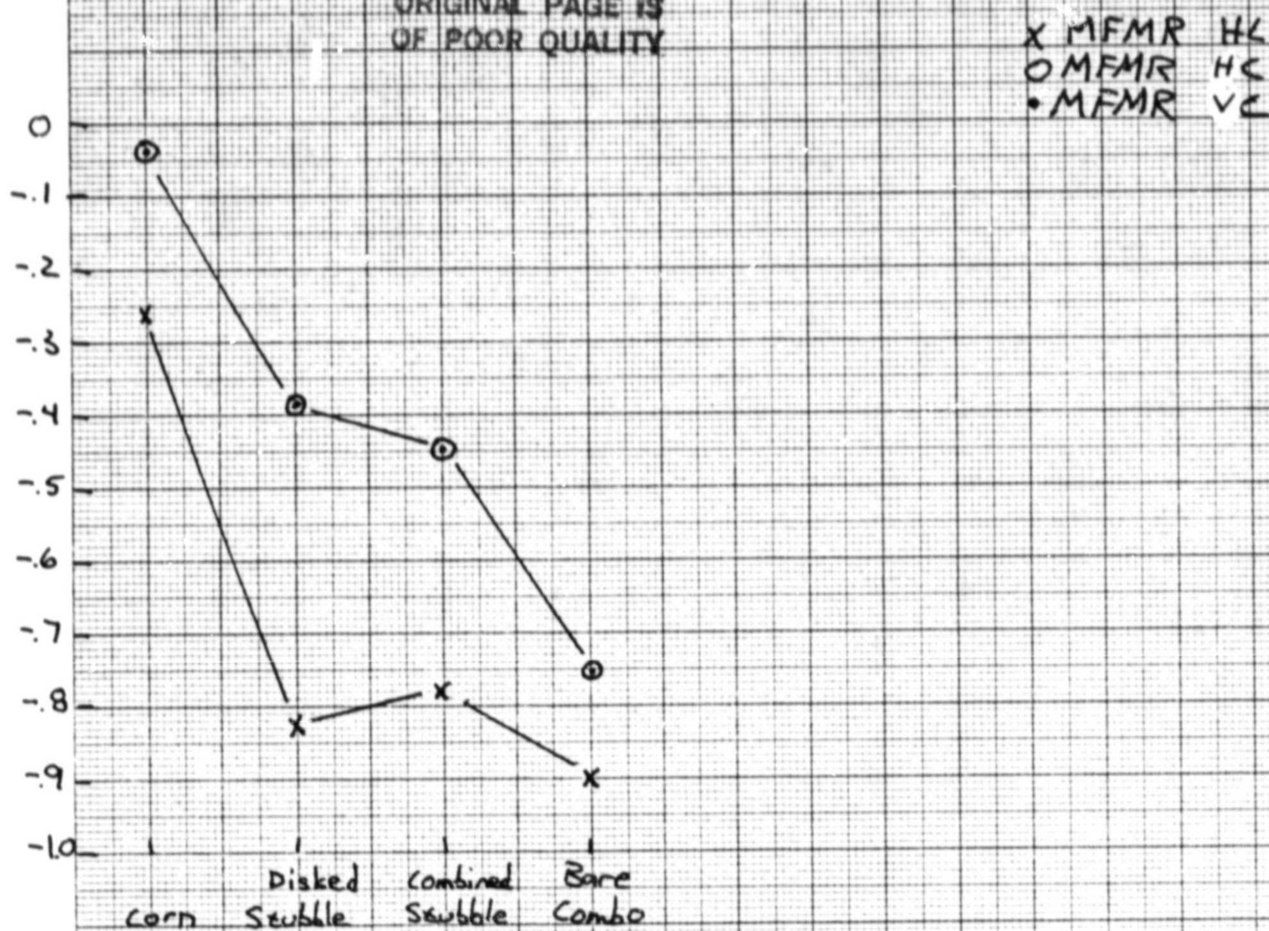


Fig 10 Correlation of FLD Ø-2 Vs Thematic Mapper Simulator

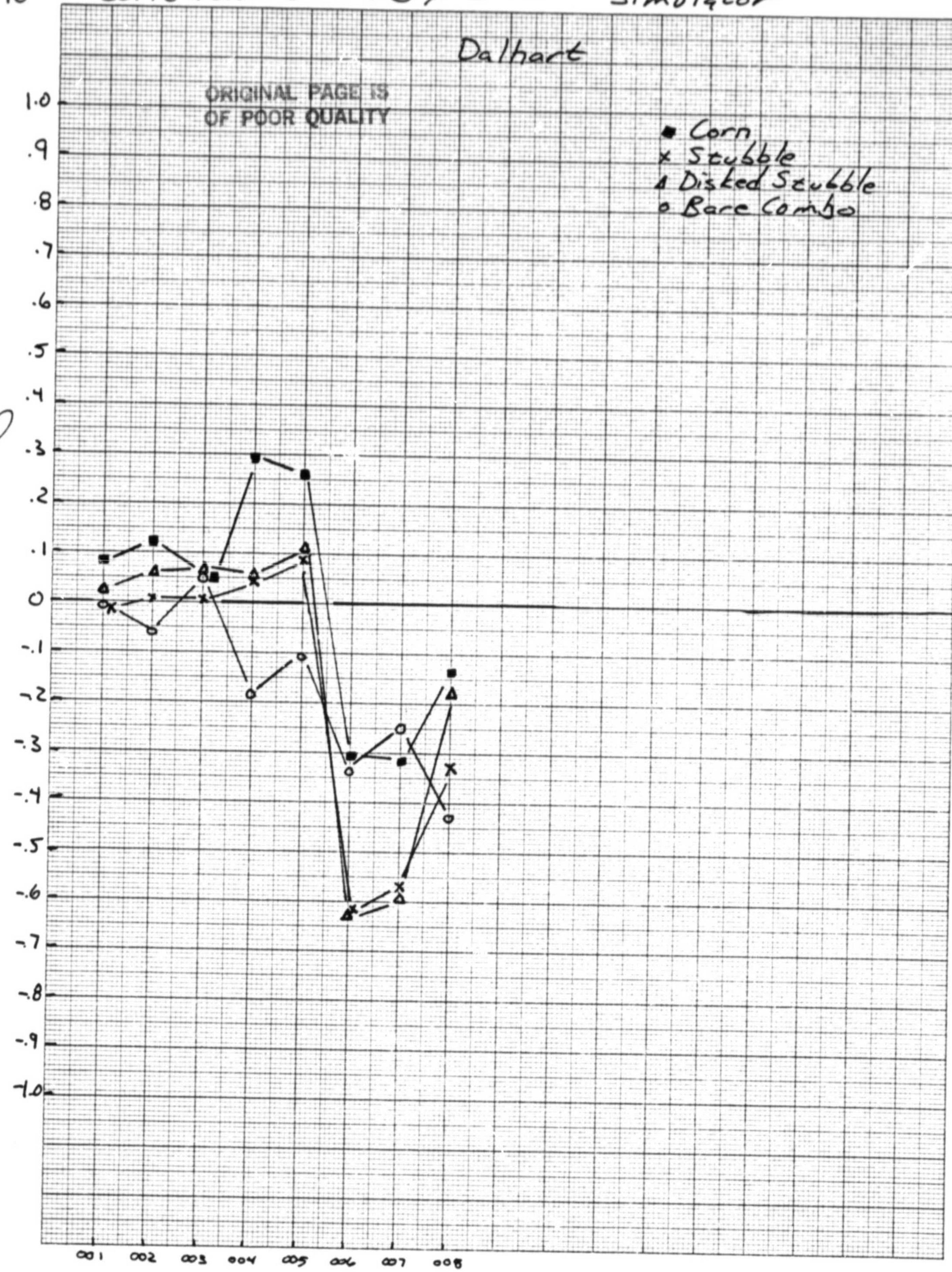


Fig 11A

Correlation of Scatterometer VS Depth of Sample

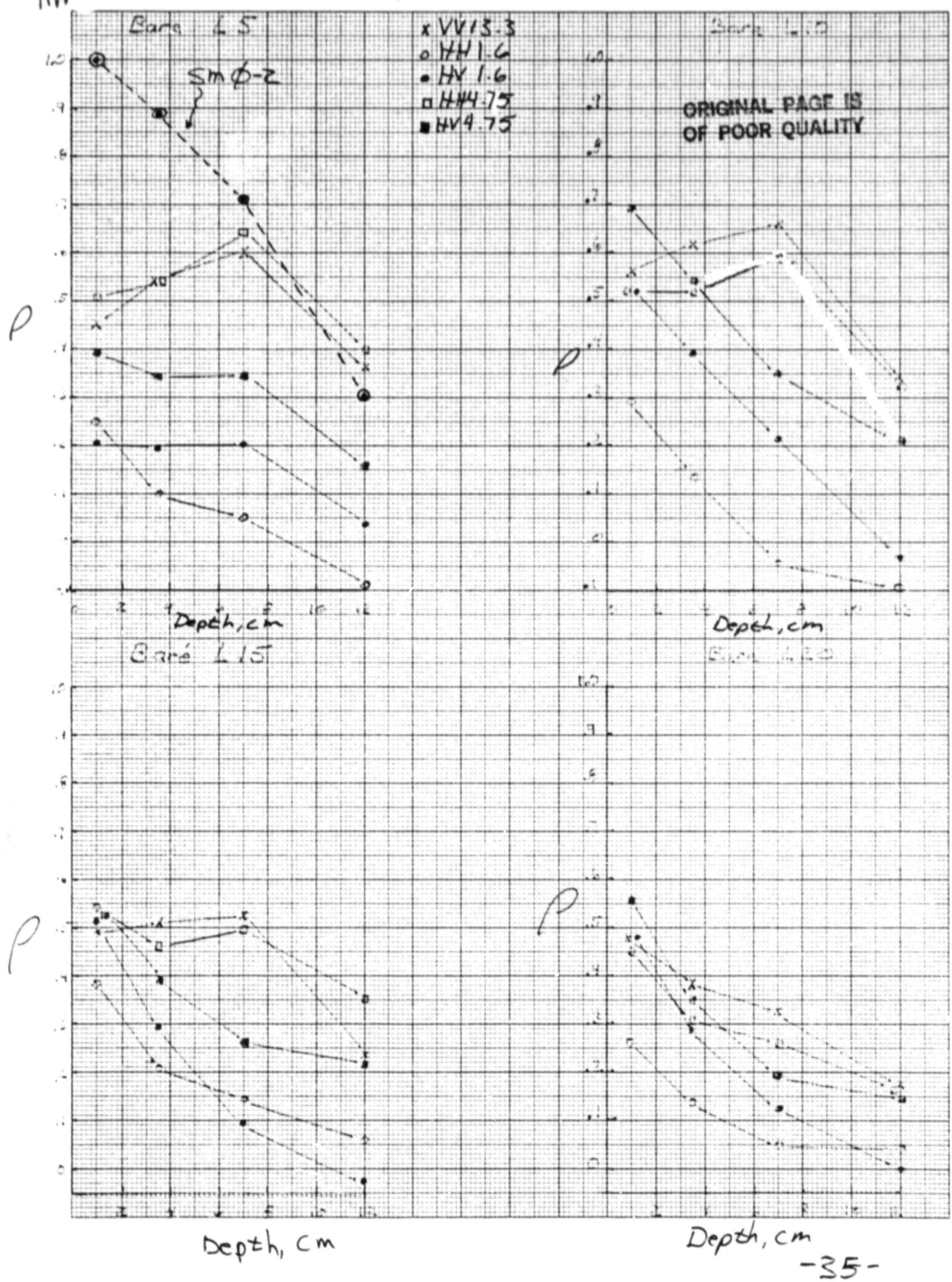


Fig 11B Correlation of Scatterometers Vs Depth of Sample

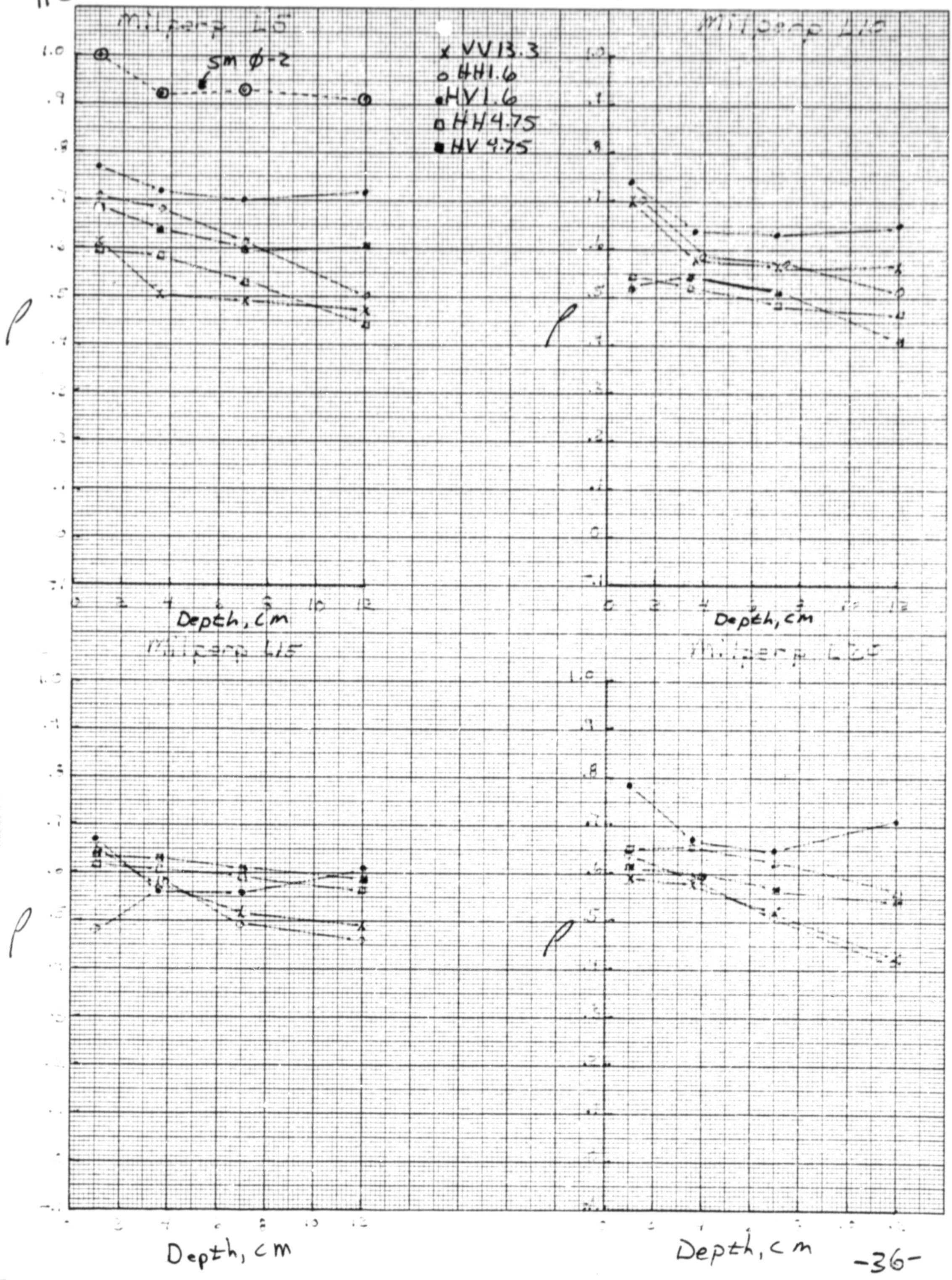
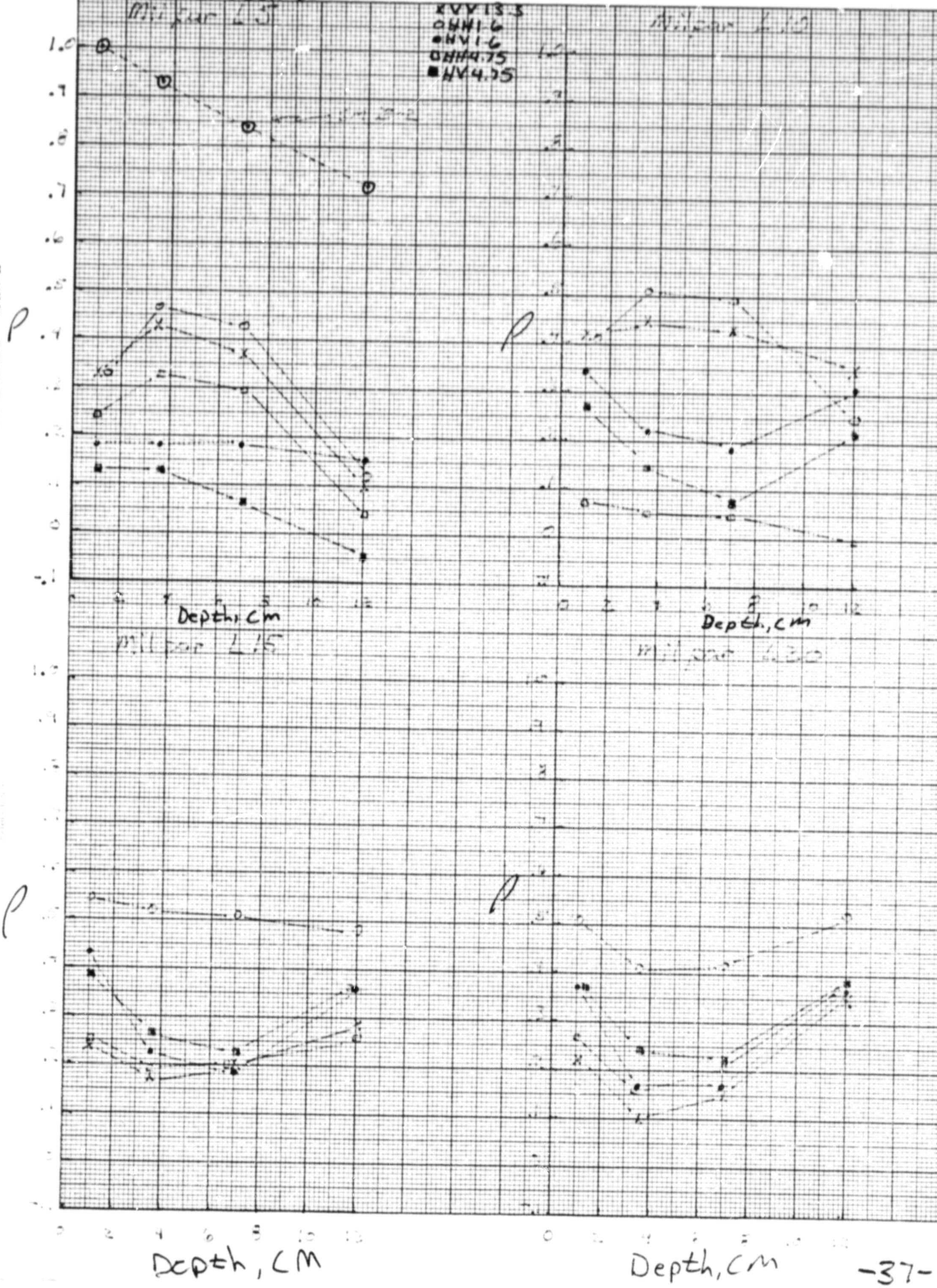


Fig 11C


XVV13.3
OHH1.6
•HV1.6
OHH4.75
■HV4.75
ρ
Depth, cm
ρ
Depth, cm
ρ
Depth, CM
ρ
Depth, CM

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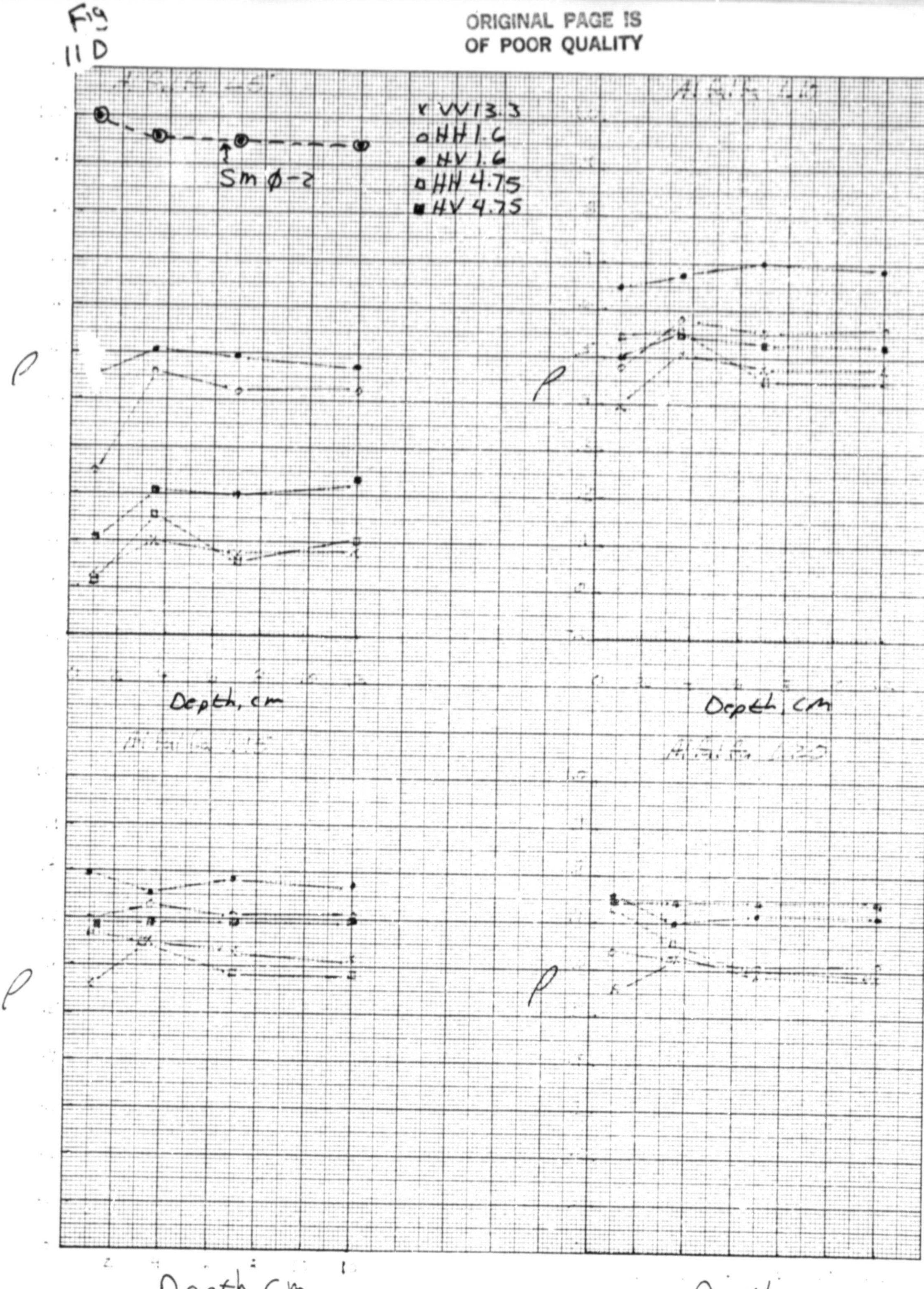


Fig 12

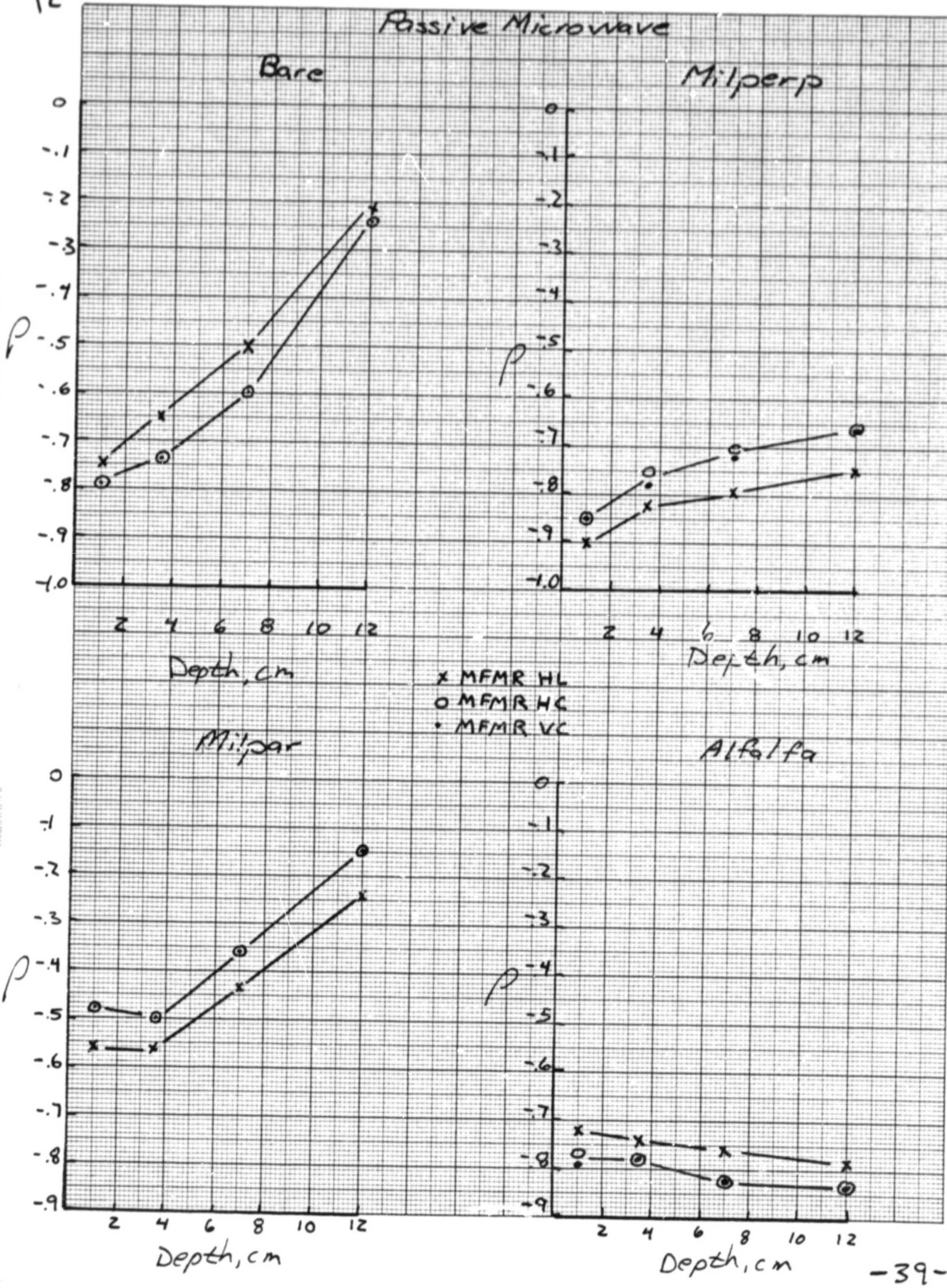

Passive Microwave
Bare
Milperp
Milpar
Alfalfa
ρ
0
-.1
-.2
-.3
-.4
-.5
-.6
-.7
-.8
-.9
-1.0
2
4
6
8
10
12
Depth, cm
x MFMR HL
o MFMR HC
• MFMR VC

Fig 13A

Correlation of Scatterometers Vs Depth of Sample

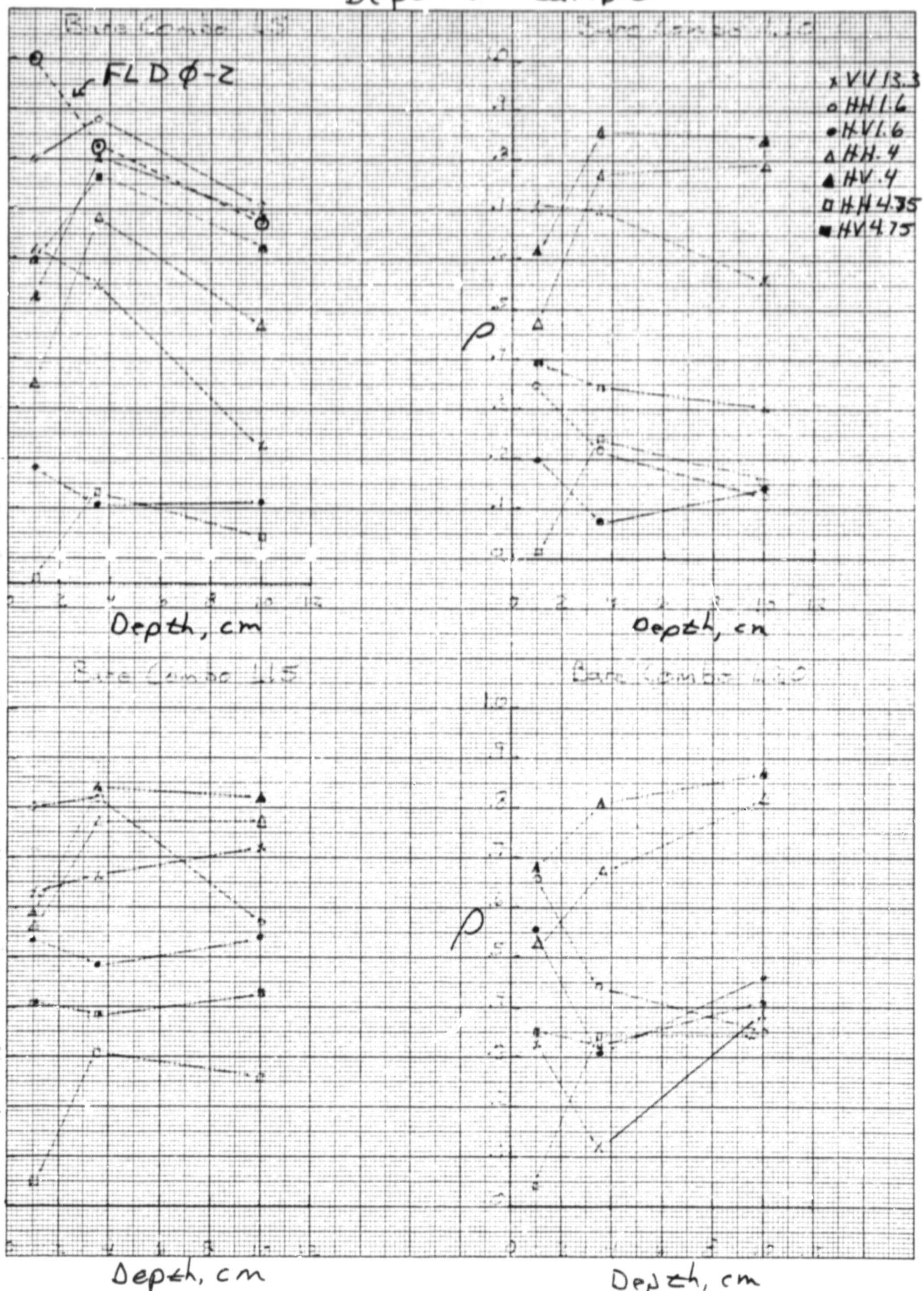


Fig 13B

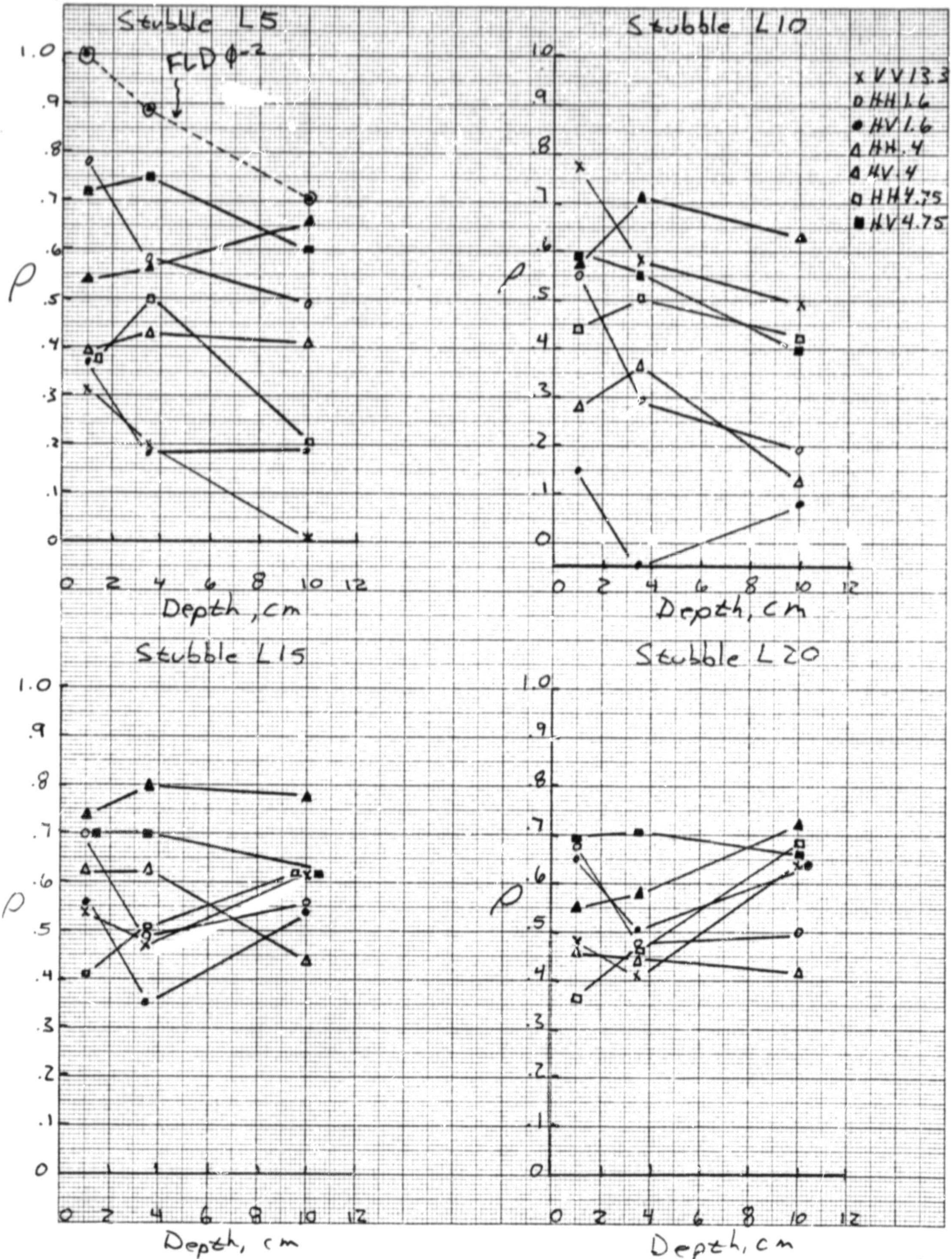

Stubble L5
FLD ϕ-2
Stubble L10
x VV 13.3
o HH 1.6
• HV 1.6
Δ HH .4
▲ HV .4
□ HH 4.75
■ HV 4.75
ρ
Depth, cm
Stubble L15
Stubble L20
Depth, cm

Fig 13C Correlation of Scatterometers Vs Depth of Sample

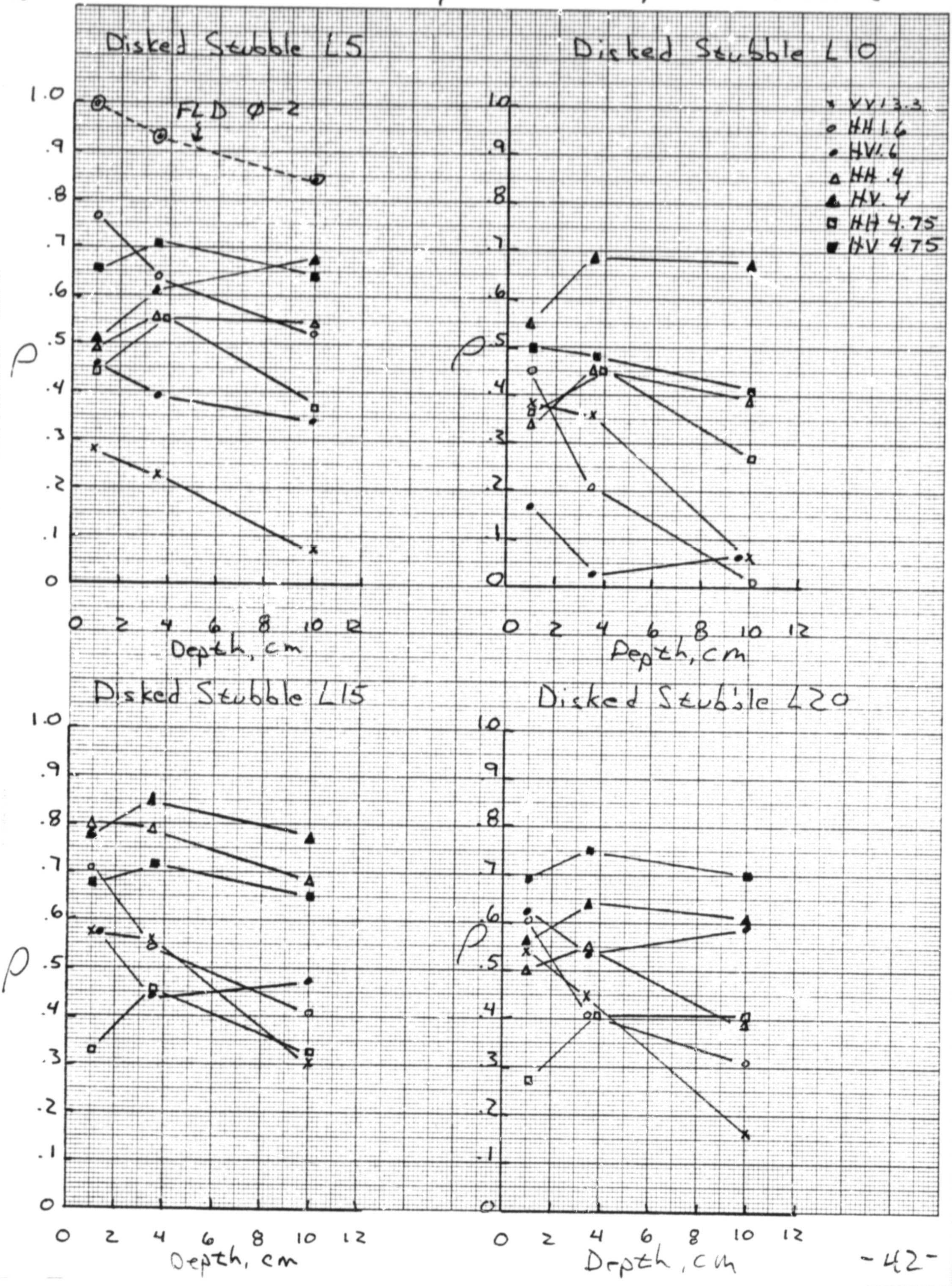


Fig
13 D

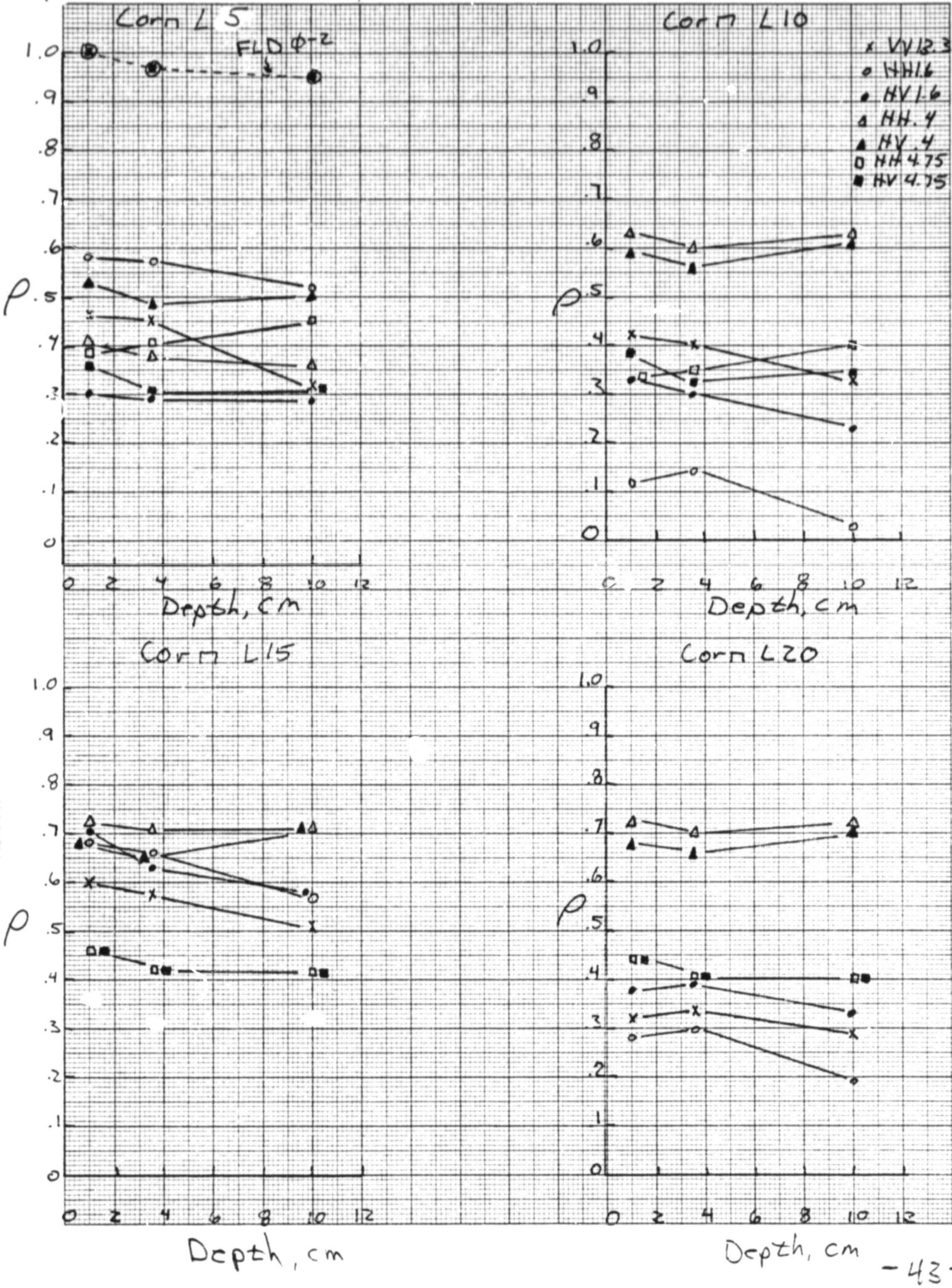
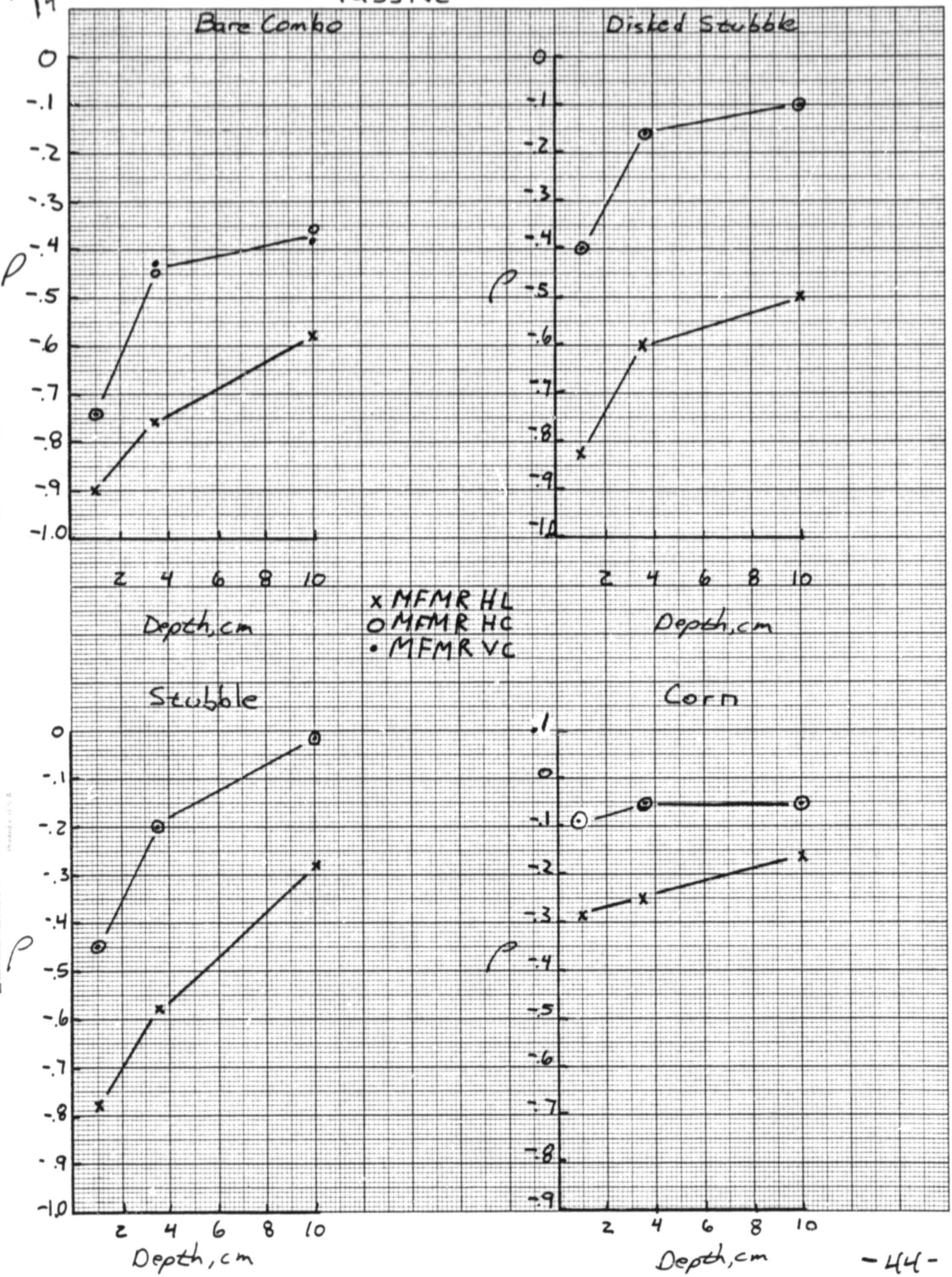

Corn L 5
FLD Φ-2
Corn L10
× VV 13.3
o HH 1.6
• HV 1.6
Δ HH .4
▲ HV .4
□ HH 4.75
■ HV 4.75
Corn L15
Corn L20
ρ
Depth, cm
0
2
4
6
8
10
12
.1
.2
.3
.4
.5
.6
.7
.8
.9
1.0

Fig 14

Passive Microwave



2.13 Single Variable Regressions

A comparison of the linear regressions with SM02 and FLD02 as the dependent variable parametric in cover types is shown in Figures 15 and 16. The scatterometer regressions are for look angles less than 25 degrees as the independent variable.

The standard error of estimate of SM02 and FLD02 for the scatterometers and passive microwave sensors are shown in Figures 17 and 18. Note that for the Guymon data the highest standard errors are recorded by the cross-polarized scatterometers and specifically for the alfalfa fields. The bare fields evidenced the lowest standard errors. For the Dalhart data the parallel-polarized scatterometers tend to follow their cross-polarized counterparts, especially in the higher look angles. The combined stubble fields tend to show the lower standard errors and corn the higher standard errors. A summary of the complete set of one independent variable regression constants showing effects of cover and look angle is summarized in Figures 19 and 20. Note the typical progressions up and down the line as the look angle is varied for each cover type. The Dalhart data is particularly interesting in that the majority of cover types with the exception of corn, tend to parallel each other through the various look angles. The graphs also tend to lay close to a linear projection through the axis (Figure 20). This is true for all the Dalhart scatterometers and the passive microwave sensors excluding both the HH and HV 4.75 scatterometers in Figures 20F and 20G. The latter sensors are very unique in appearing to be relatively insensitive to a change in look angle.

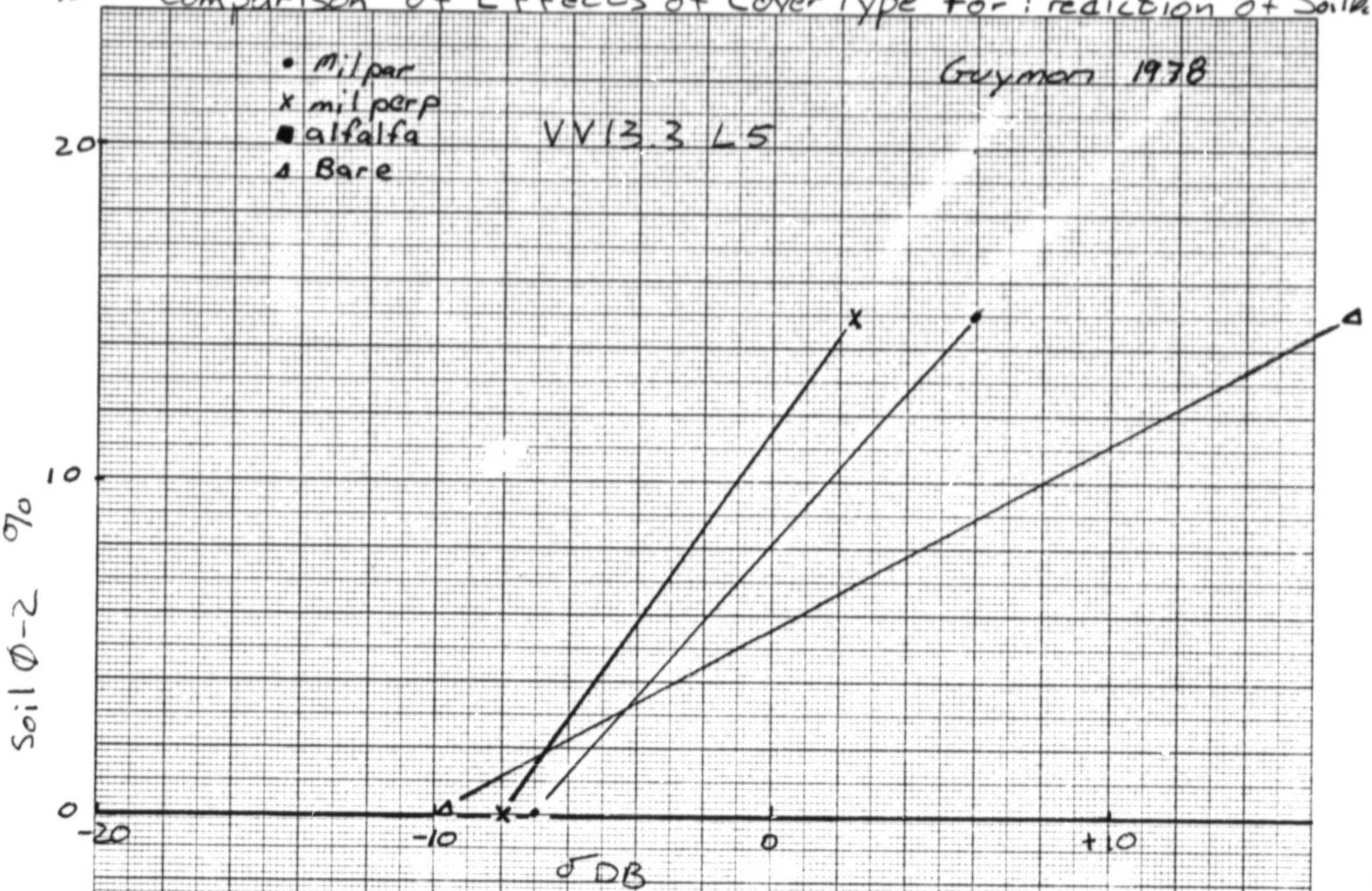
The calculated sensor responses necessary to 'predict' soil moisture values of SM/ FLD02 = 0%, 5%, and 15% are shown in Figures 21-24 (Guymon) and Figures 25-28 (Dalhart). Note that such calculation does not adjust

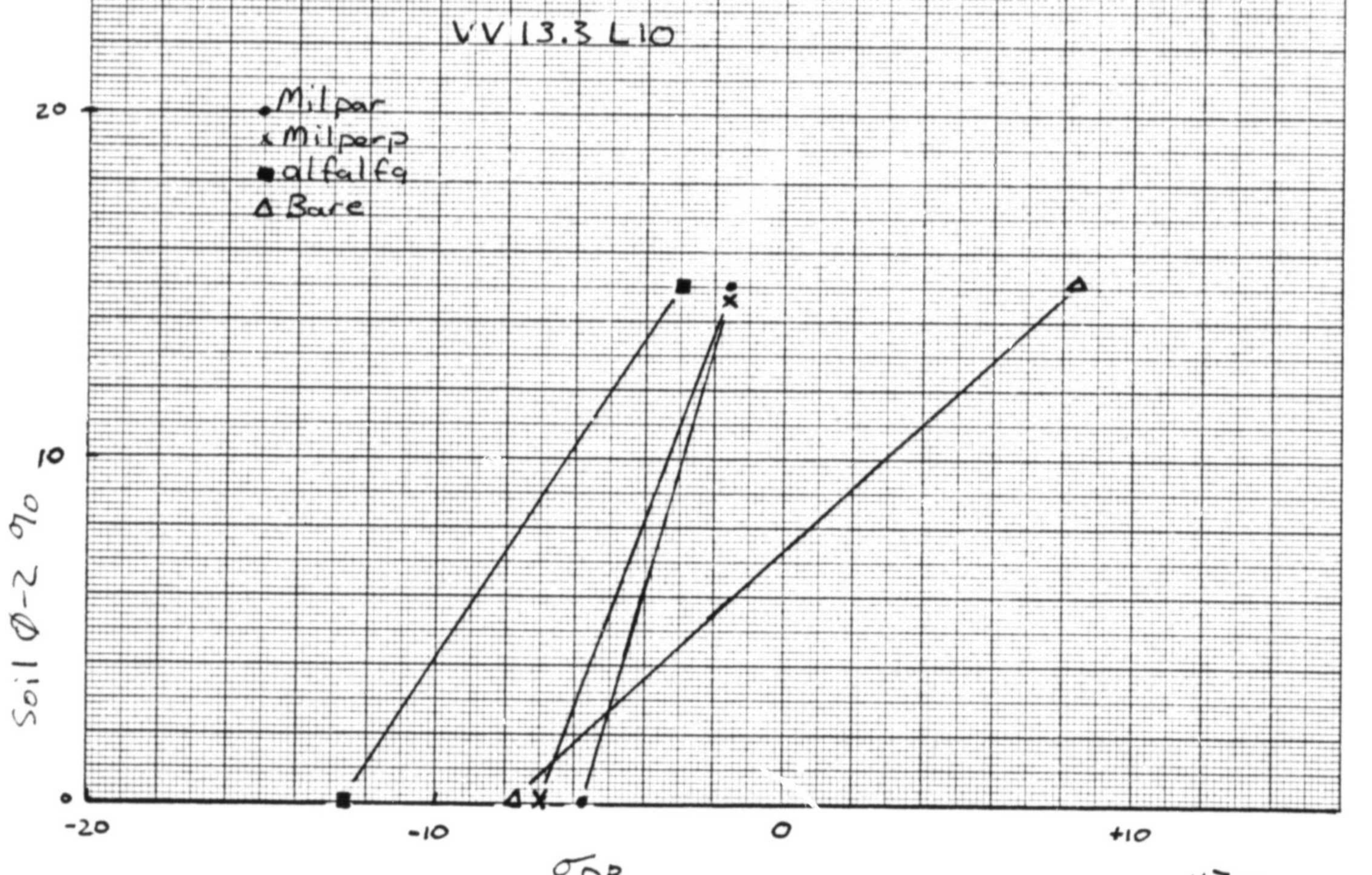
the soil moisture depth-profiles to conform to a common, single profile for each cover group. Thus direct comparisons to determine the effect of single variable changes are still confounded by such convolved and different effects. Notice that for the bare and milo par fields the required HV 1.6 scattering coefficients are within about 1 dB. but in general they both fluctuate independently of the other cover types, moisture percentages, and sensors. The other covers, alfalfa and milo perp., act independently by sensor, however, they remain relatively constant throughout the range of moisture percentages. The required HV 4.75 scatterometer responses appear to be the most similar to each other and consistent with varying look angle as the effect of each cover in Guymon data is examined.

The Dalhart data analysis of the corn fields (Figures 25A-28) shows the effects of, possibly, the 'psuedo' coherent backscatter caused by the vegetation. This is also evidenced in the 'oscillatory' nature of the variable trajectories (in factor space) for the 1.6 Ghz HH and HV sensors (see Figure 37). In sharp contrast the 4.75 Ghz HH and HV sensors remain in a relatively constant (factor space) position. Note particularly the nature of the 'required responses' to predict a given soil moisture vis a vis the curves for the other, less vegetated, covers.

Fig 15A Single Variable Regressions

Comparison of Effects of Cover Type for Prediction of Soil





σDB

Fig 15C

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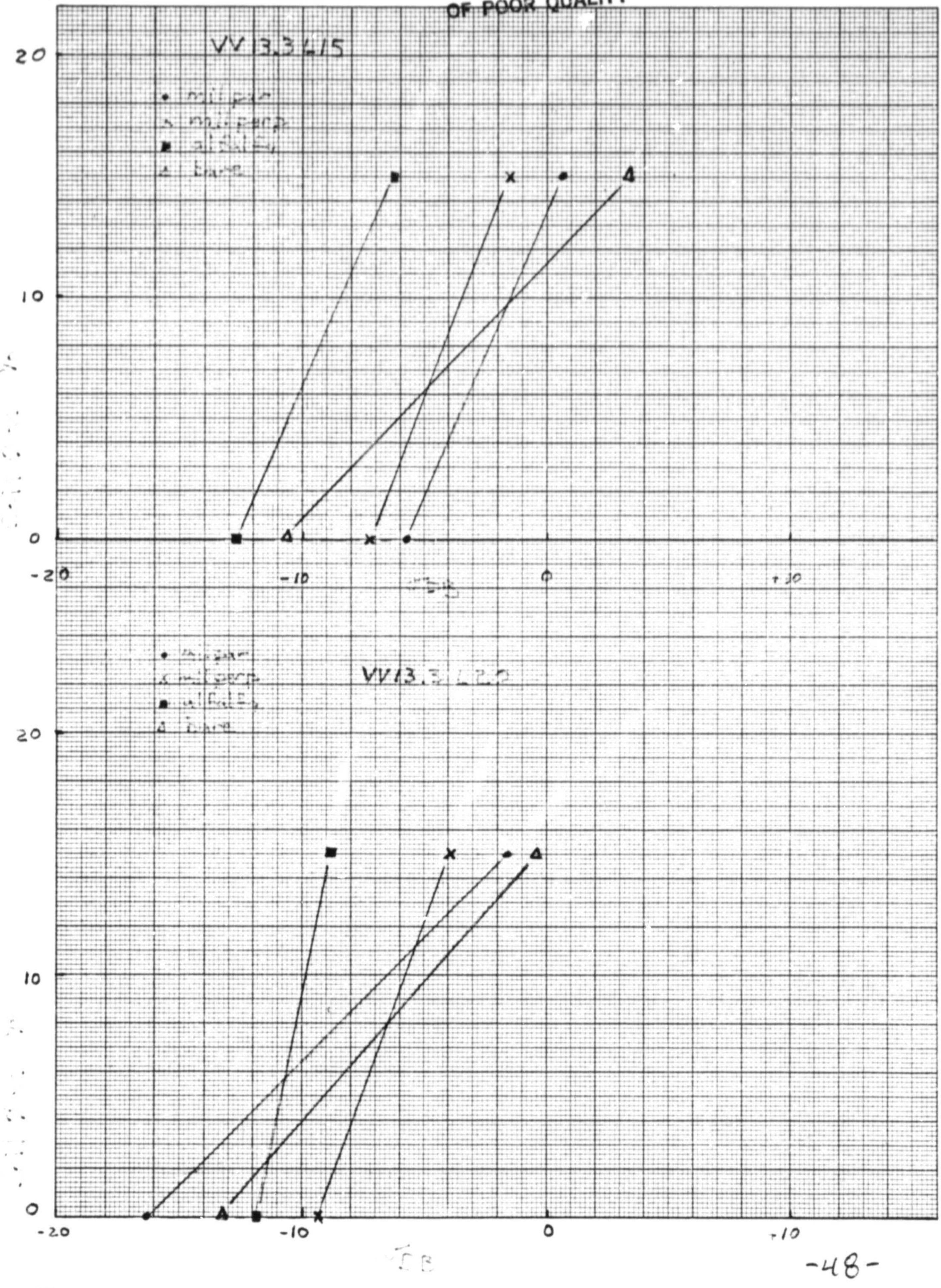

Fig 15C

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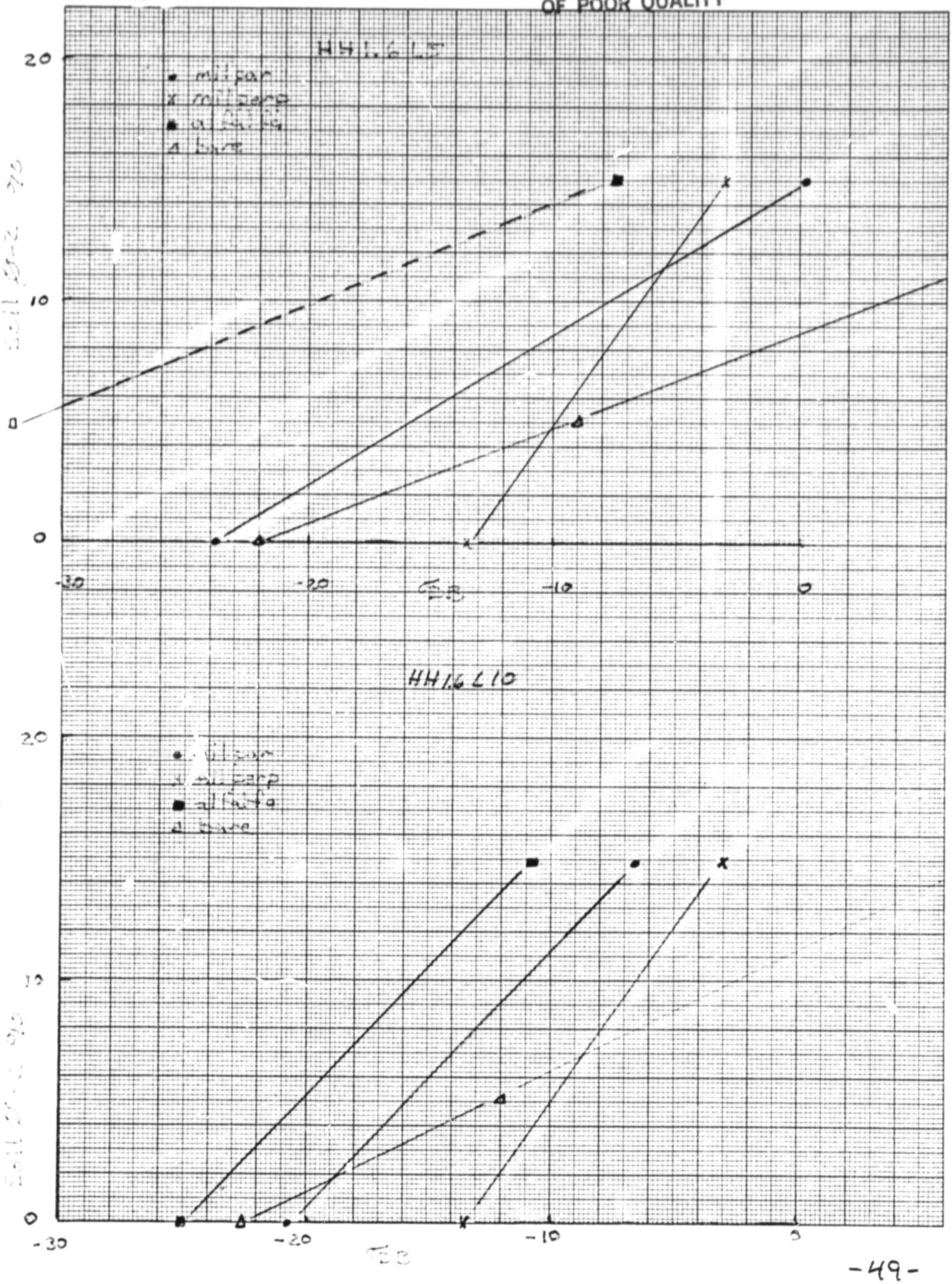

Fig 15D

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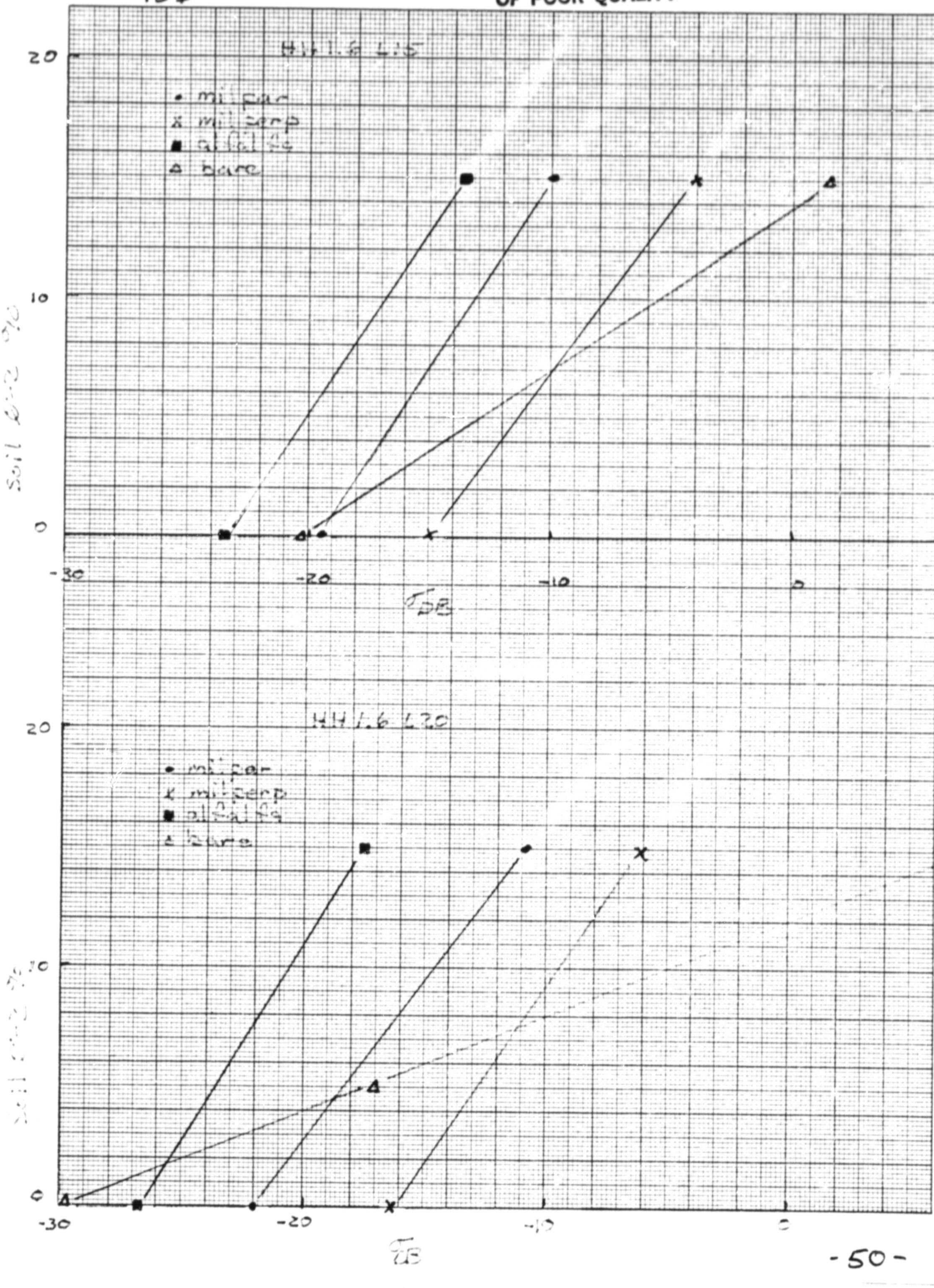


Fig
15E

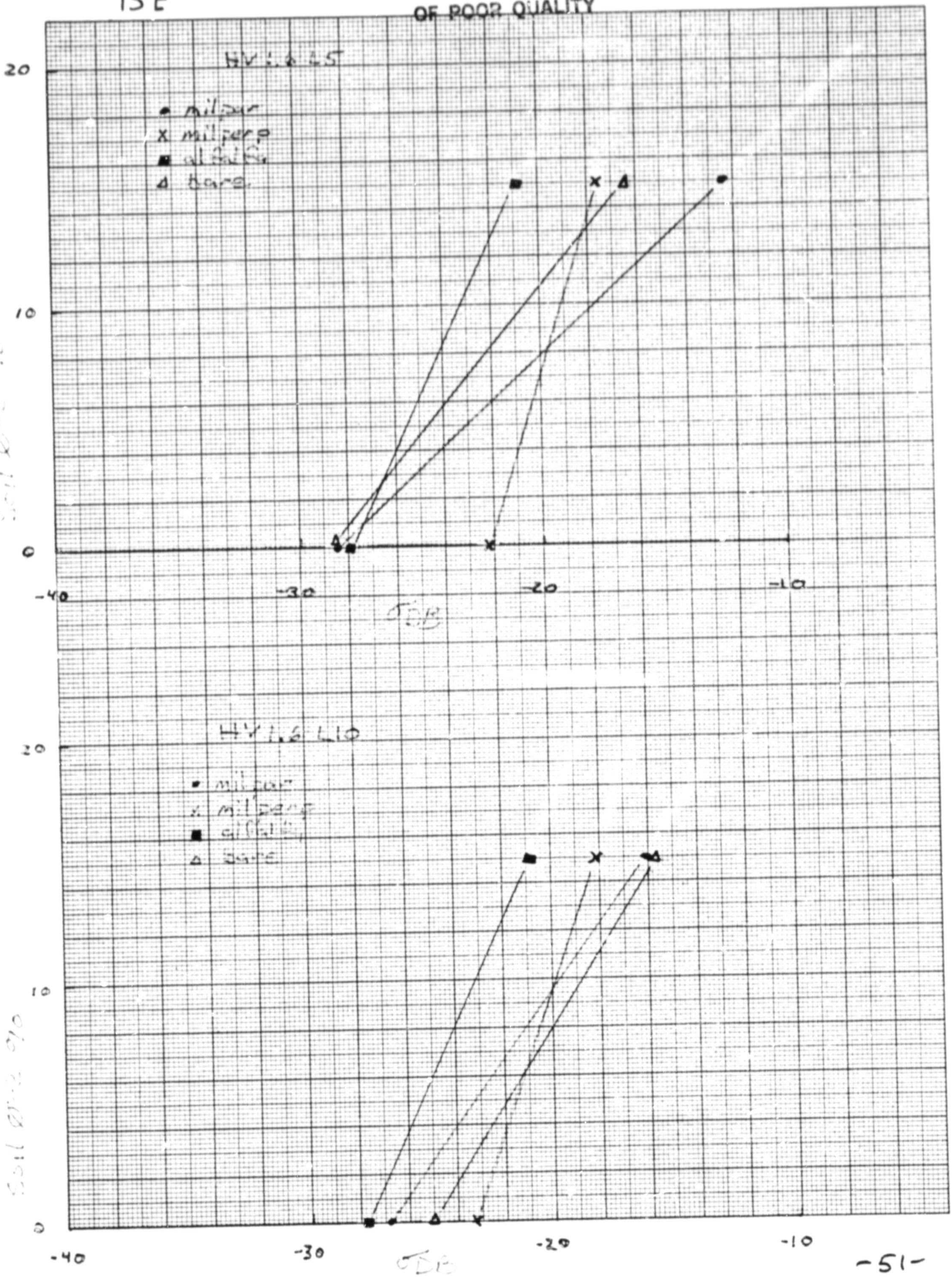
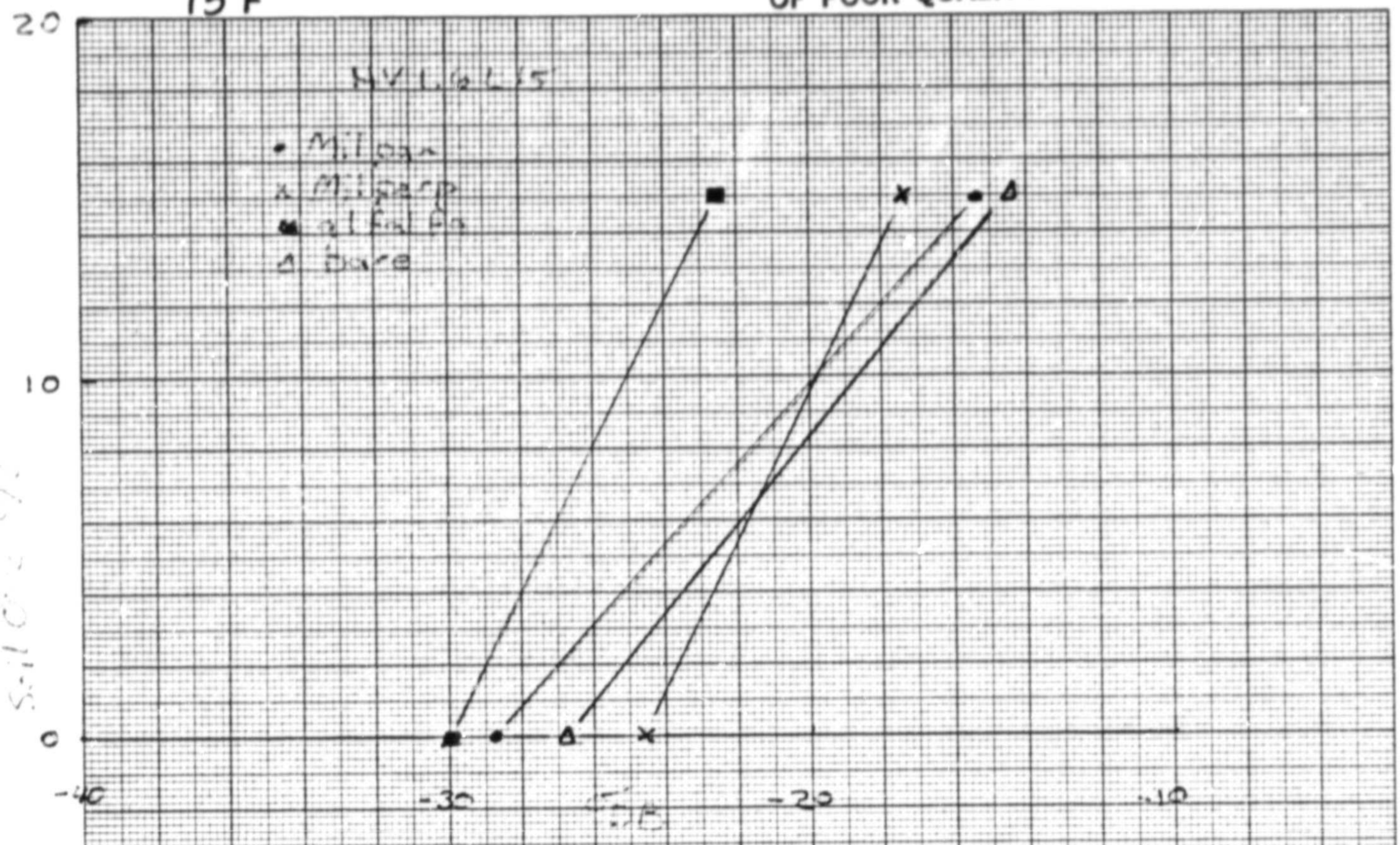

HY 1.6 L5
milpar
milperp
bare
20
10
0
-40
-30
-20
-10
σDB
HY 1.6 L10
milpar
milperp
bare
20
10
0
-40
-30
-20
-10
σDB

Fig
15F



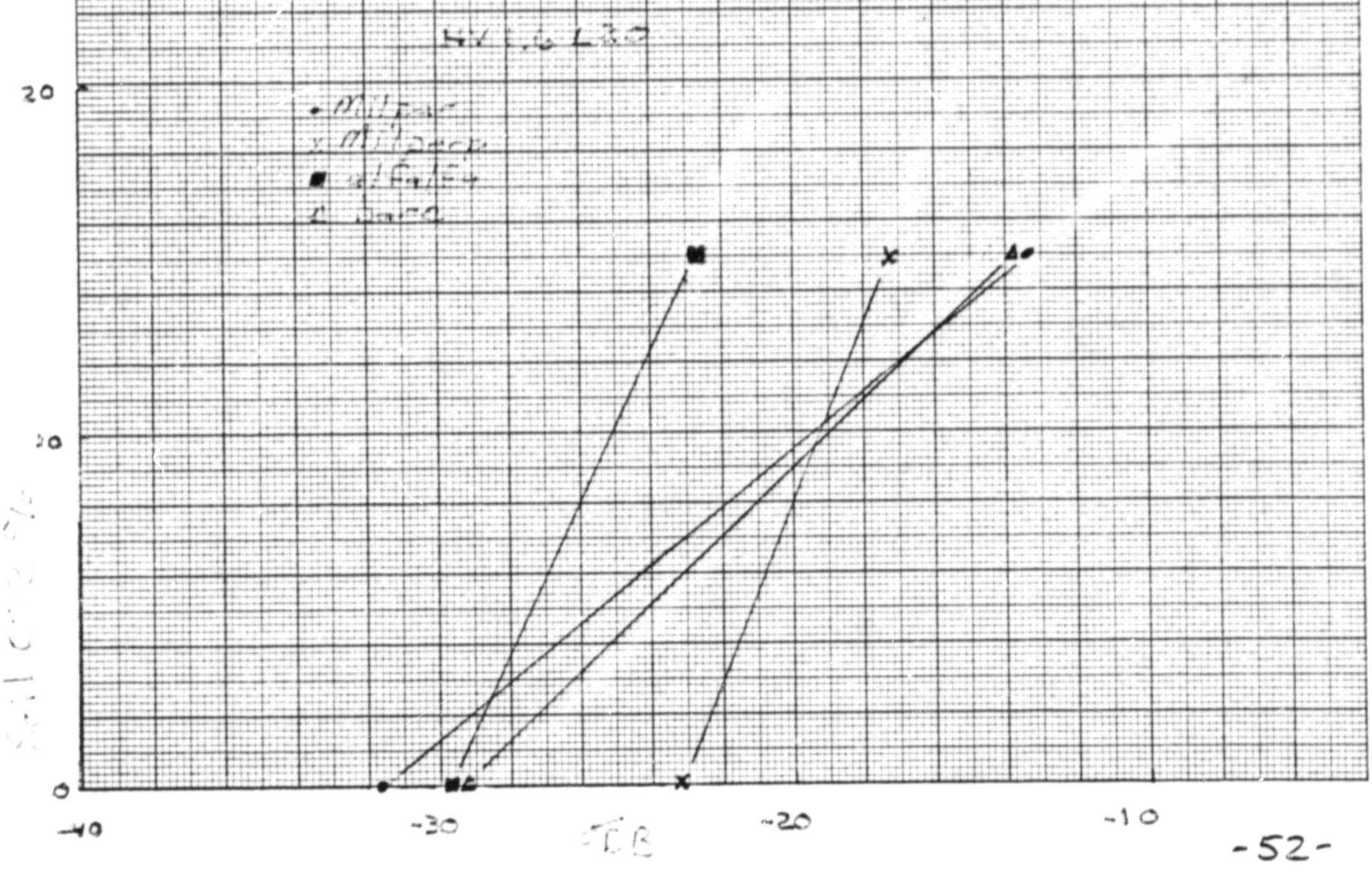


Fig 15G

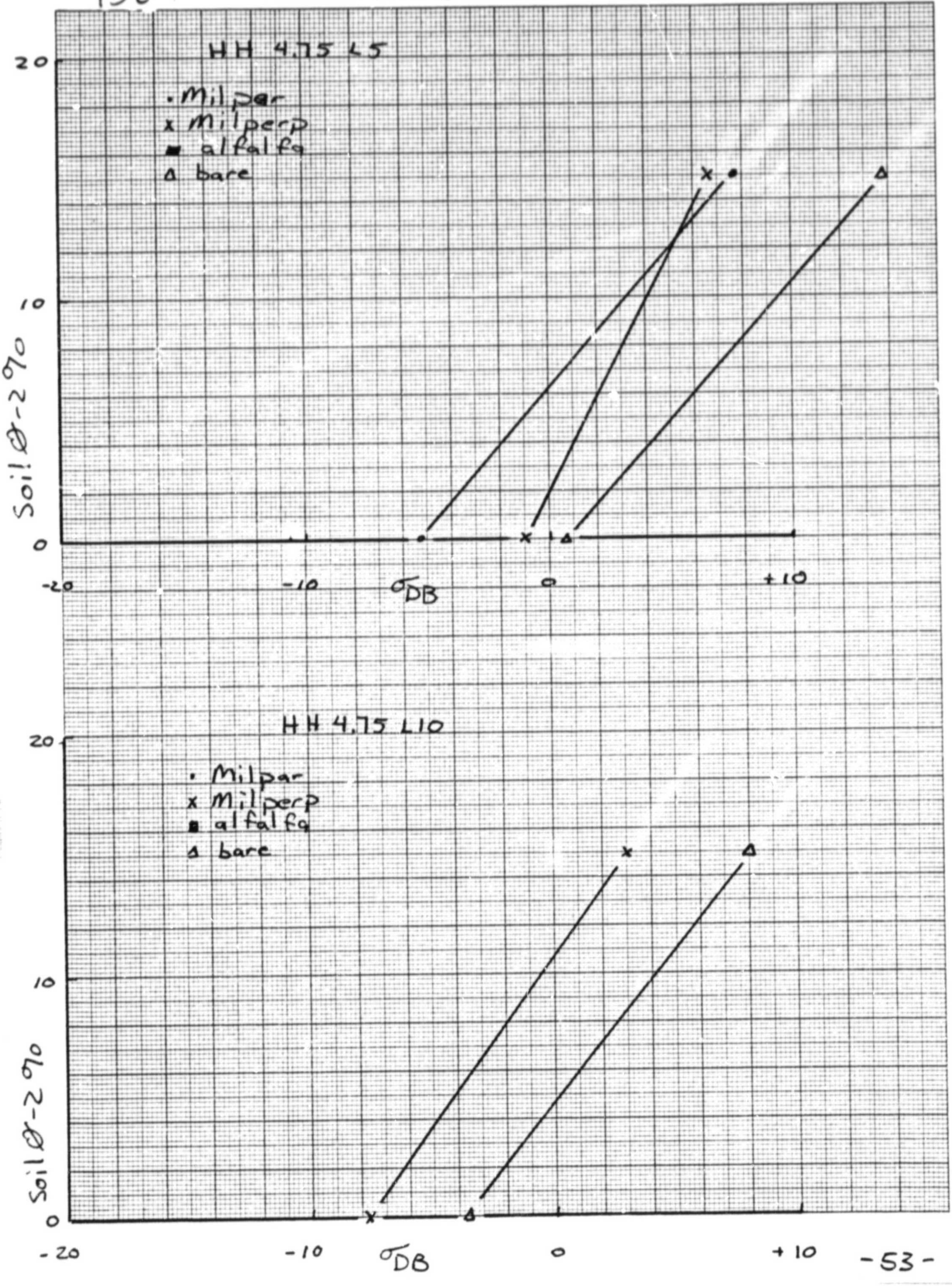
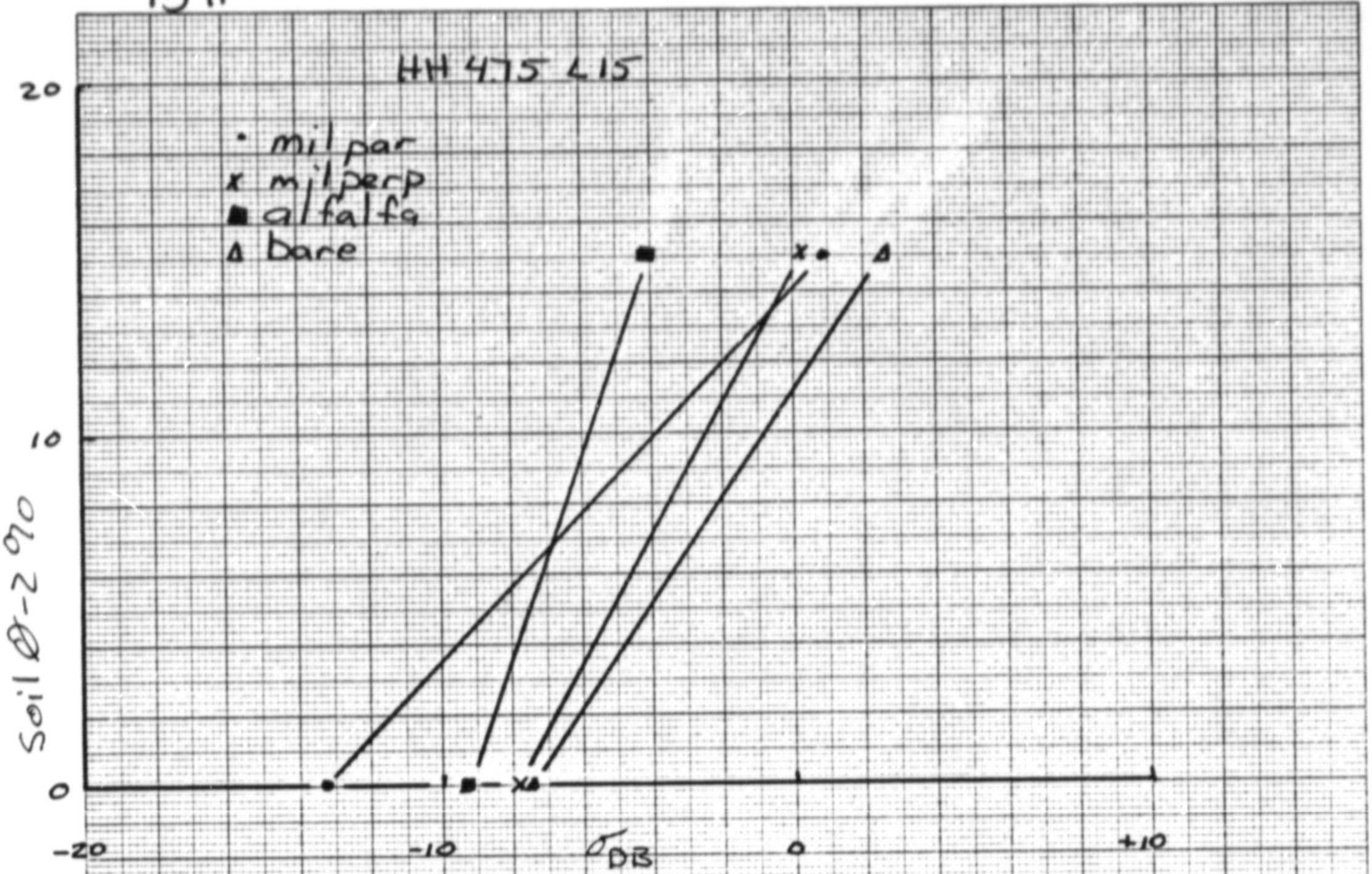

HH 4.75 L5
· Milpar
x Milperp
■ alfalfa
Δ bare
20
10
0
Soil Ø-2%
-20
-10
σDB
0
+10
HH 4.75 L10
· Milpar
x Milperp
■ alfalfa
Δ bare
20
10
0
Soil Ø-2%
-20
-10
σDB
0
+10

Fig 15 H


HH 4.75 ∠15
• mil par
x mil perp
■ alfalfa
Δ bare
Soil Ø-2 %
σDB
20
10
0
-20
-10
0
+10

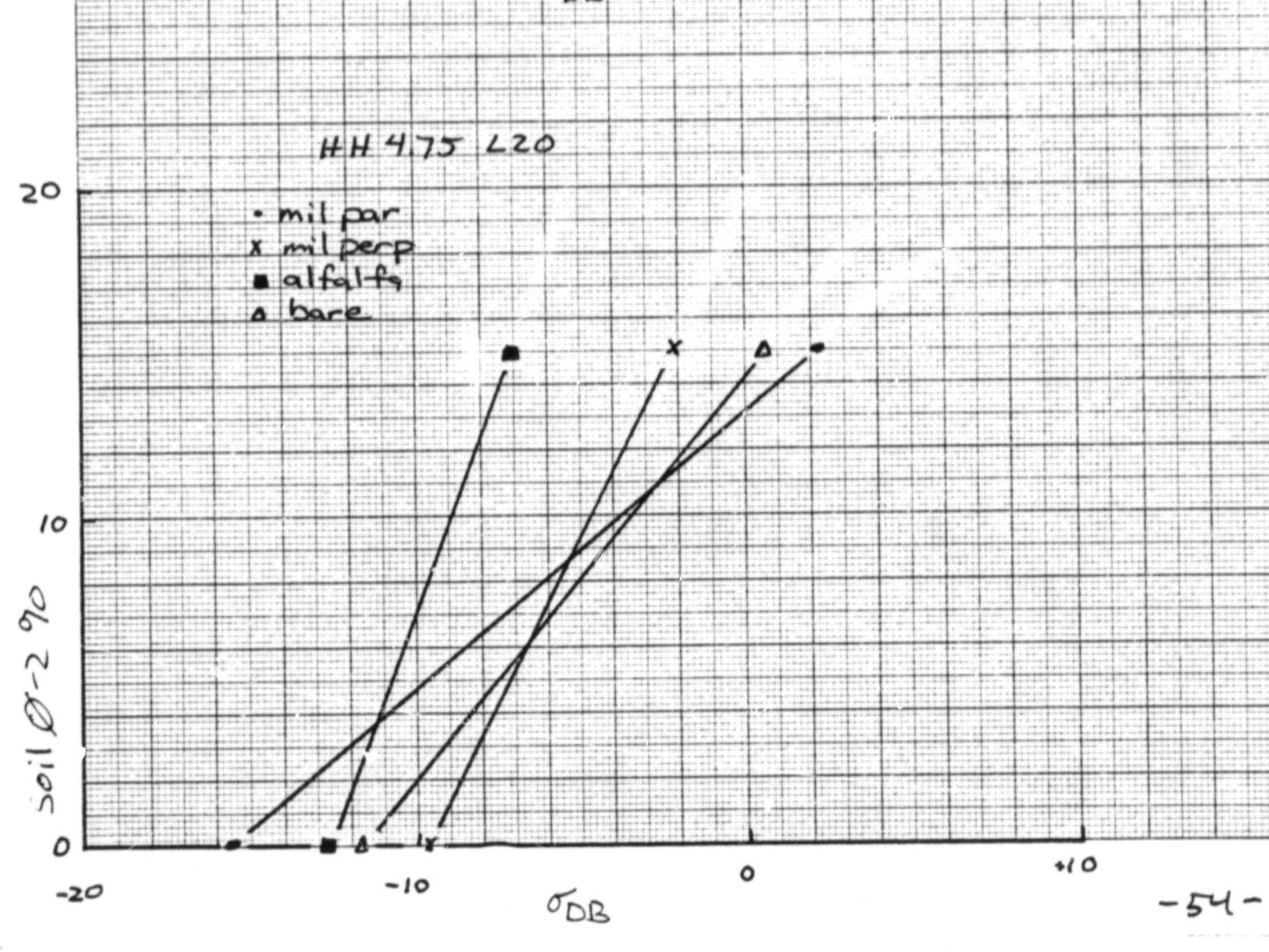
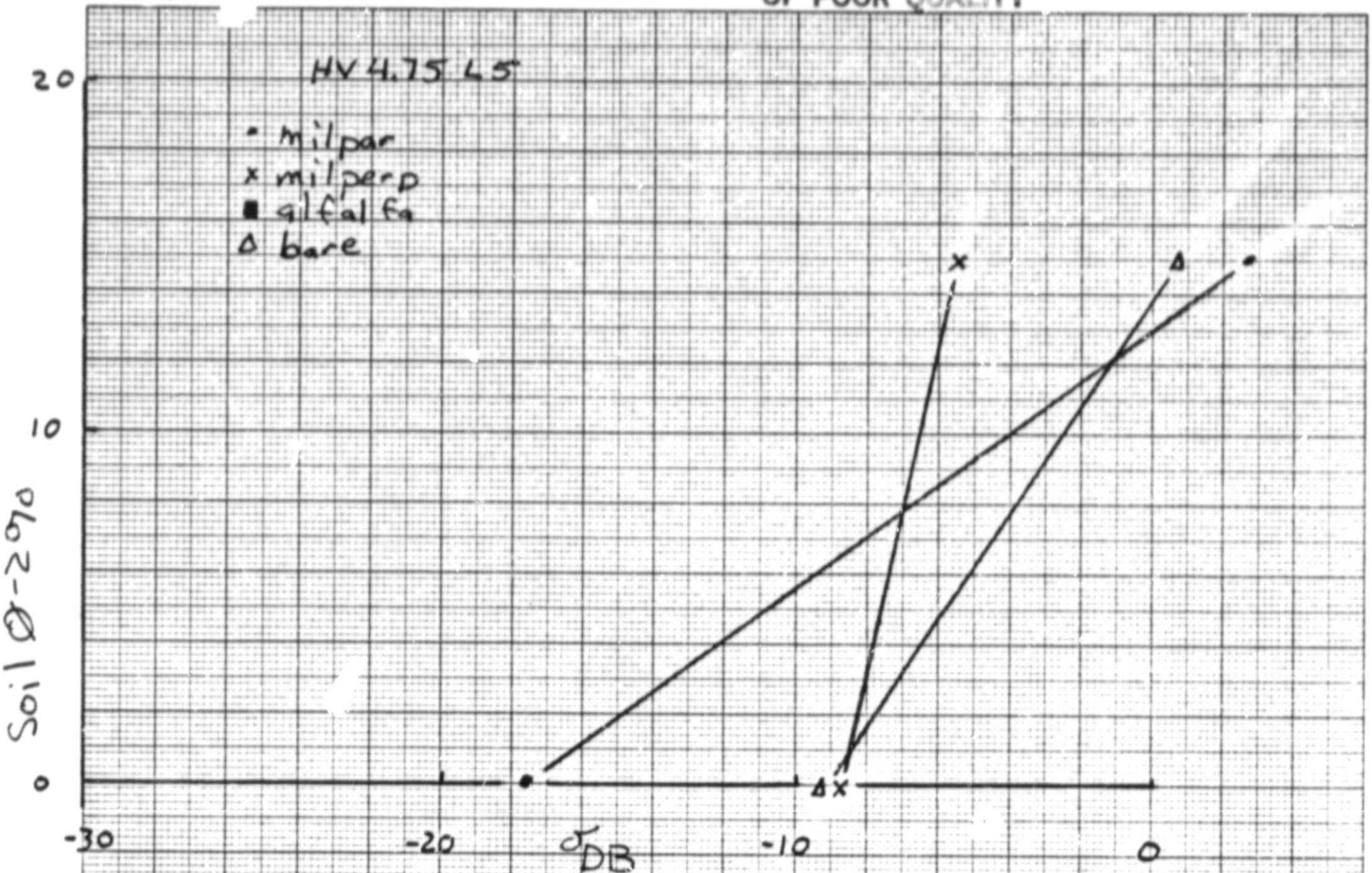

HH 4.75 ∠20
• mil par
x mil perp
■ alfalfa
Δ bare
Soil Ø-2 %
σDB
20
10
0
-20
-10
0
+10

Fig 15 I


HV 4.75 L5
• milpar
x milperp
■ alfalfa
Δ bare
Soil Ø-2%
20
10
0
-30
-20
-10
0
σ_{DB}

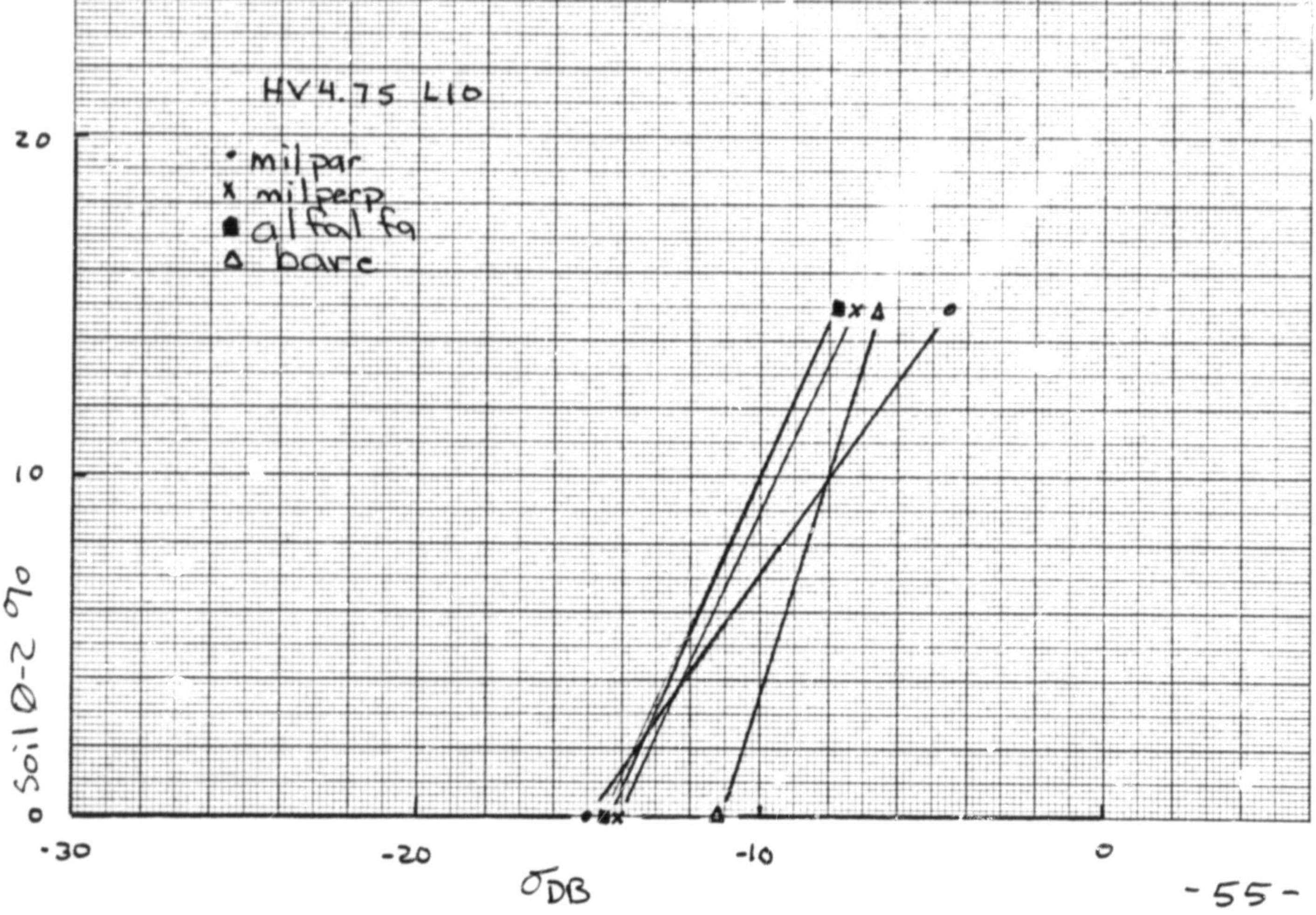

HV4.75 L10
• milpar
x milperp
■ alfalfa
Δ bare
Soil Ø-2 %
20
10
0
-30
-20
-10
0
σ_{DB}

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Fig
15J

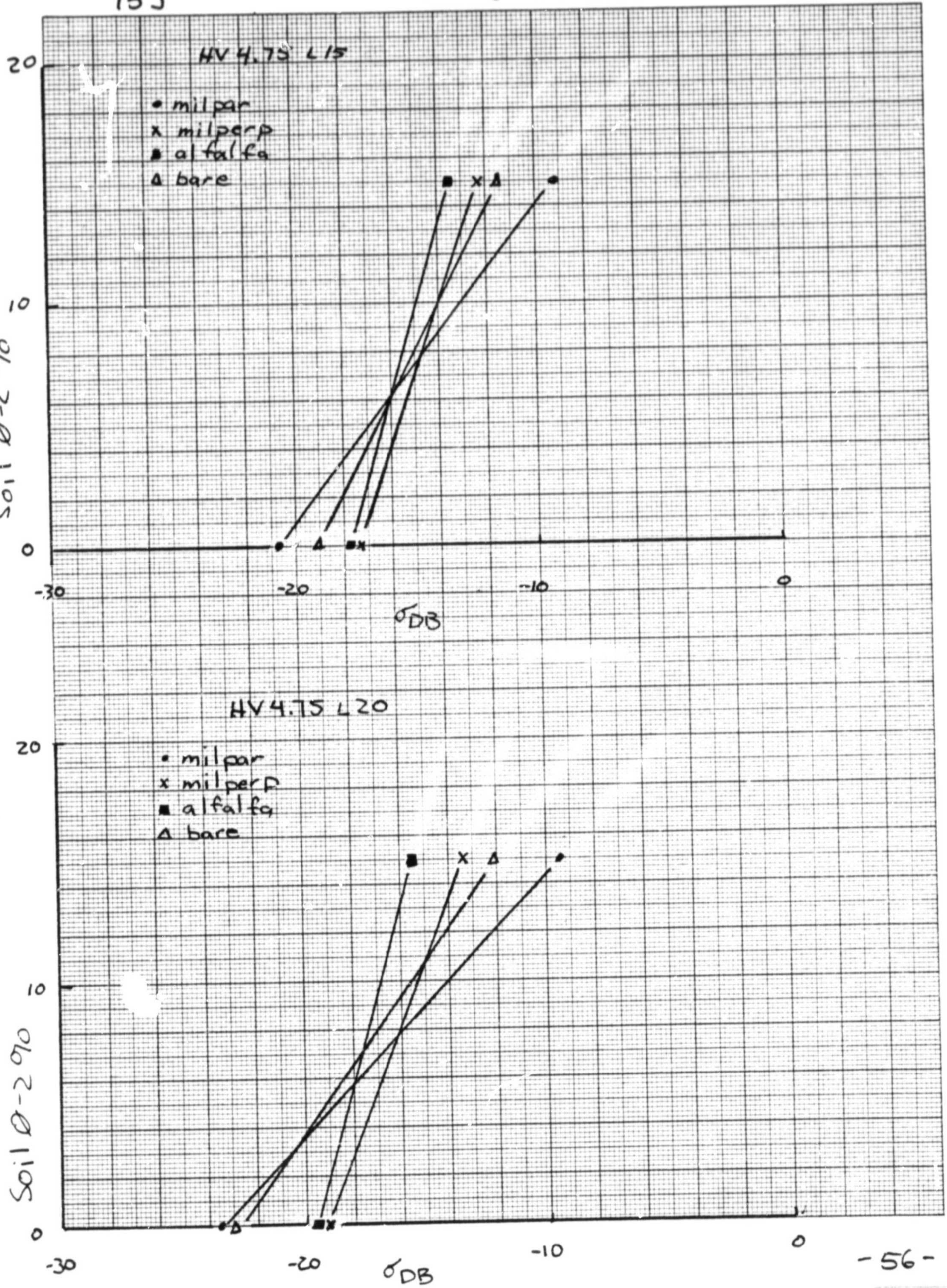
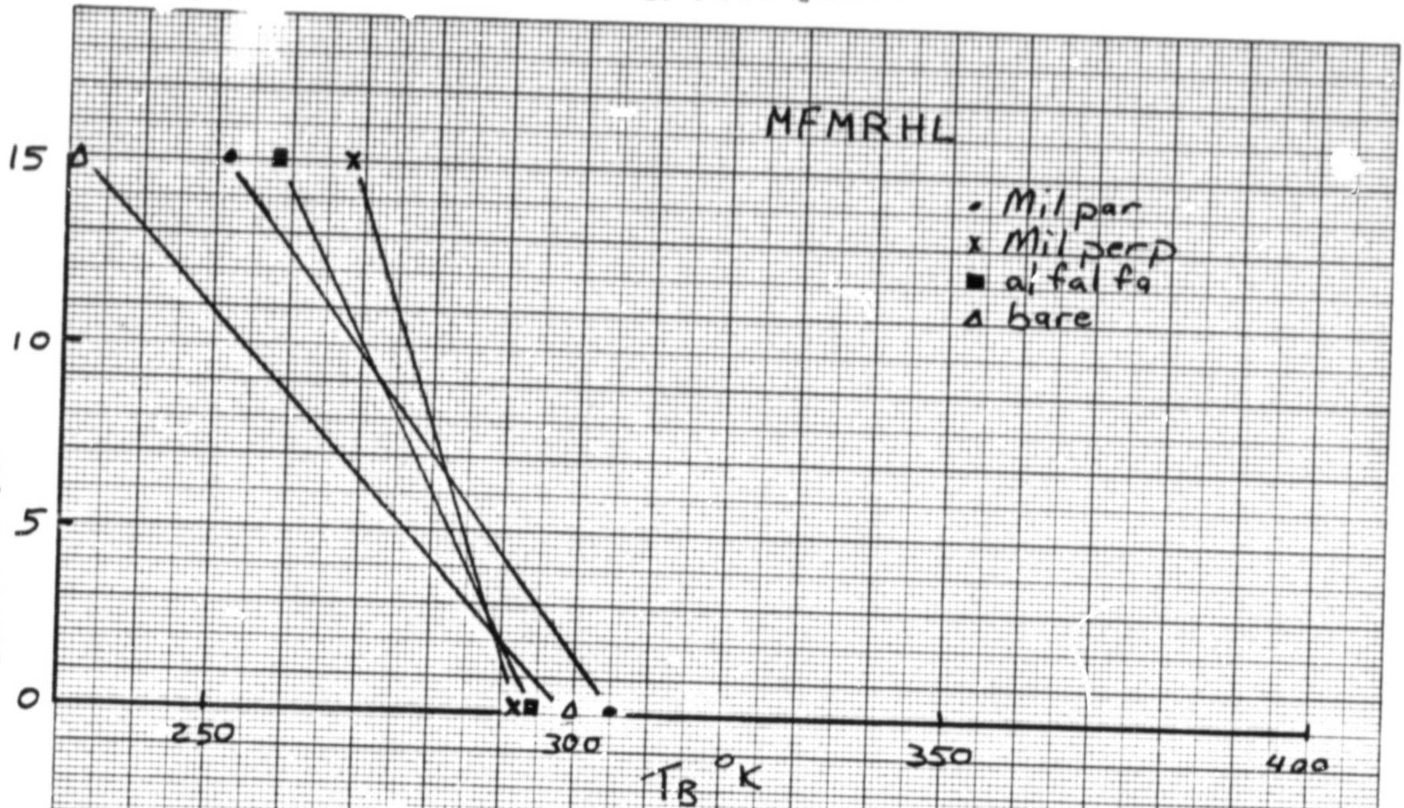


Fig 15K


MFMRHL
• Mil par
x Mil perp
■ alfalfa
Δ bare
15
10
5
0
Soil Ø-2 90
250
300
350
400
T_B °K

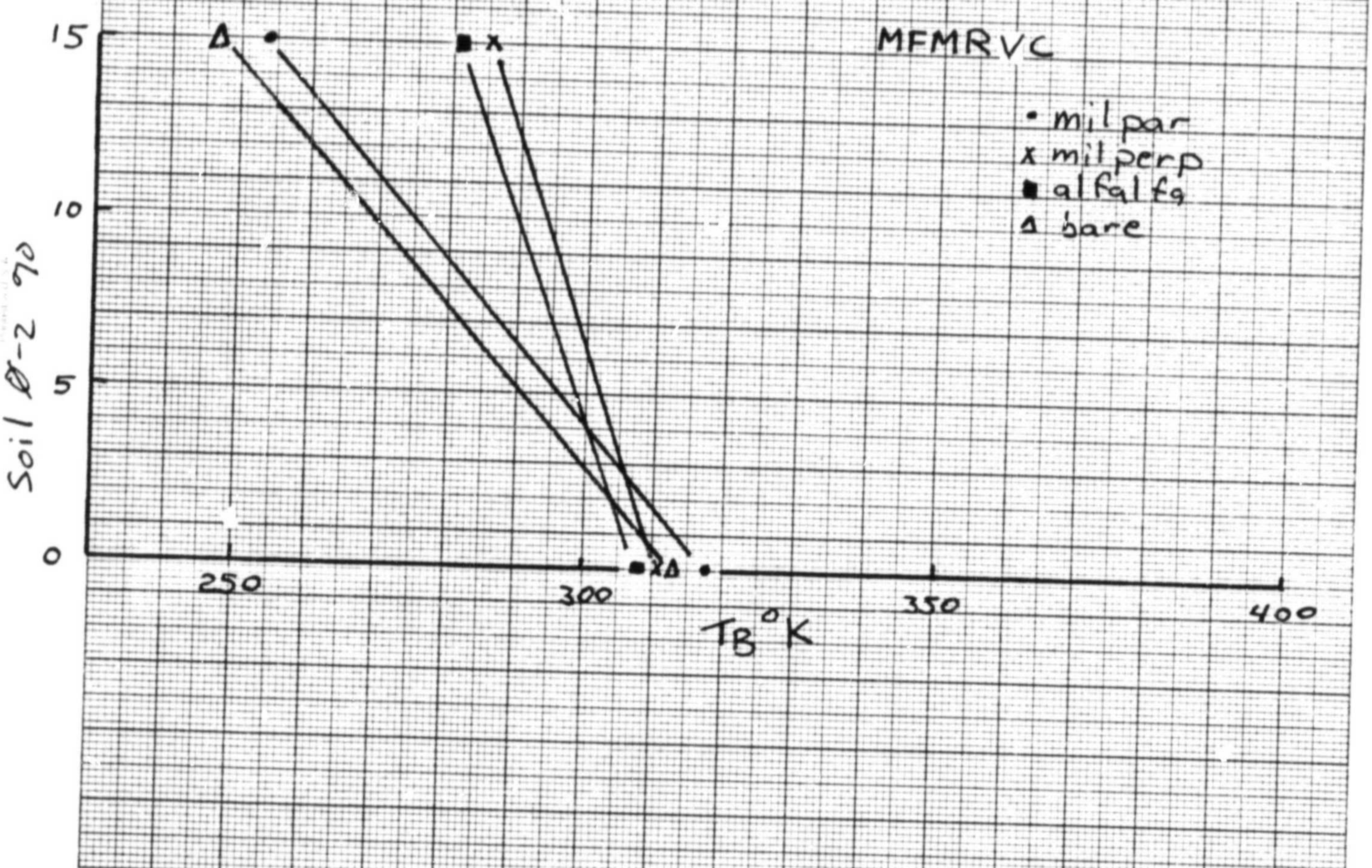

MFMRVC
• mil par
x mil perp
■ alfalfa
Δ bare
15
10
5
0
Soil Ø-2 90
250
300
350
400
T_B °K

Fig 15L

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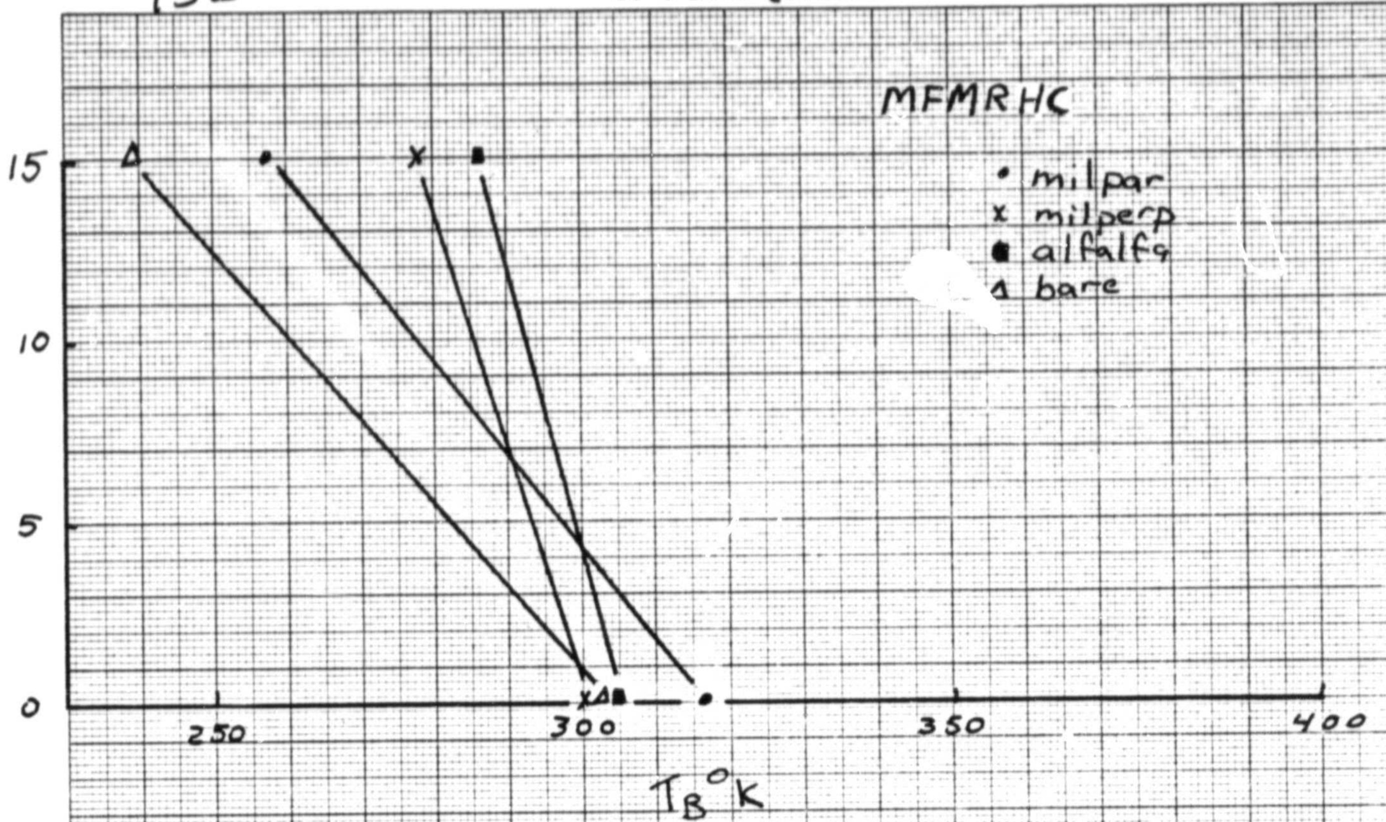


Single Variable Regressions:
Comparison of Effect of Cover Type
For Prediction of FLD Ø-2

Fig 16A

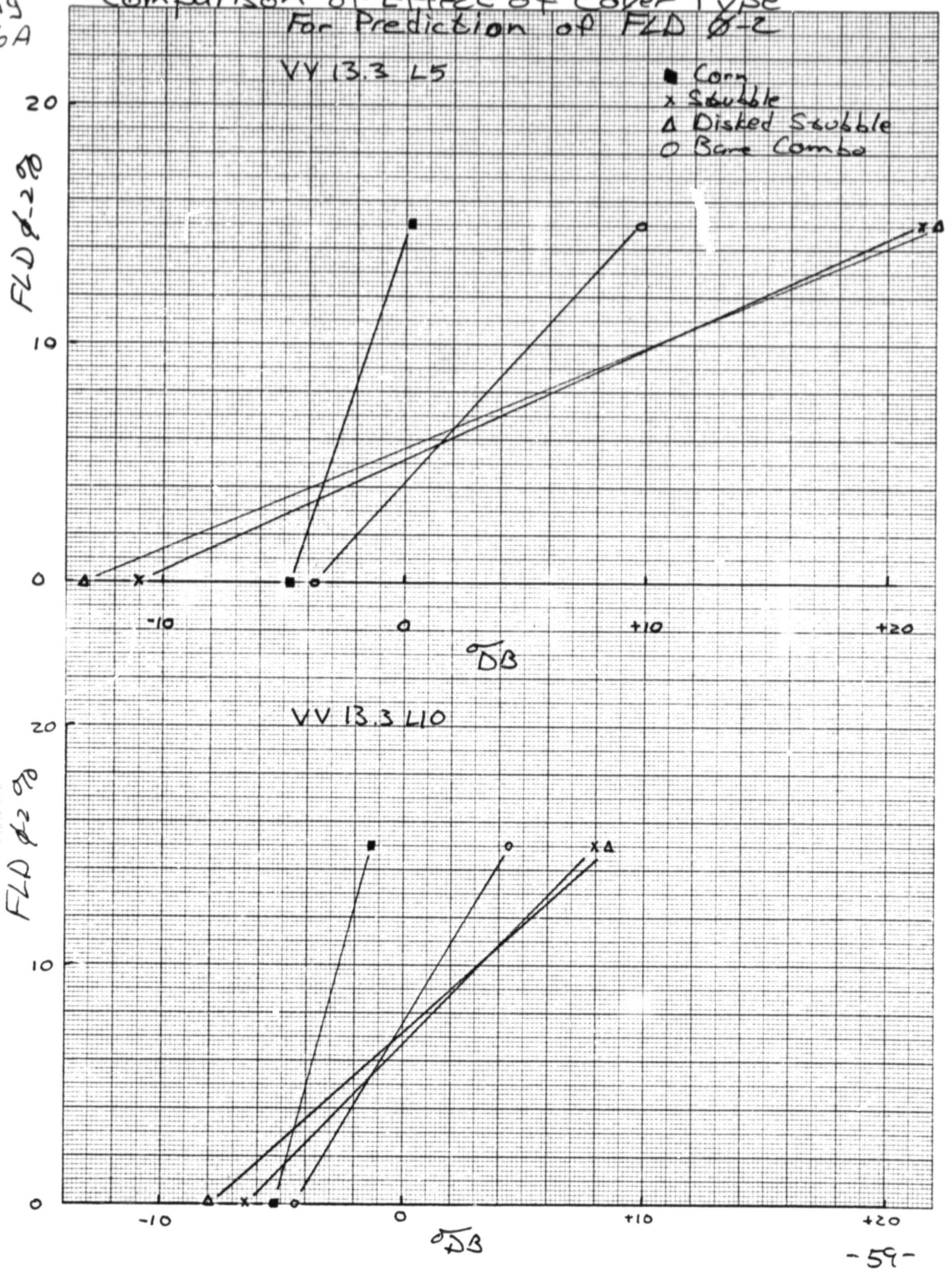
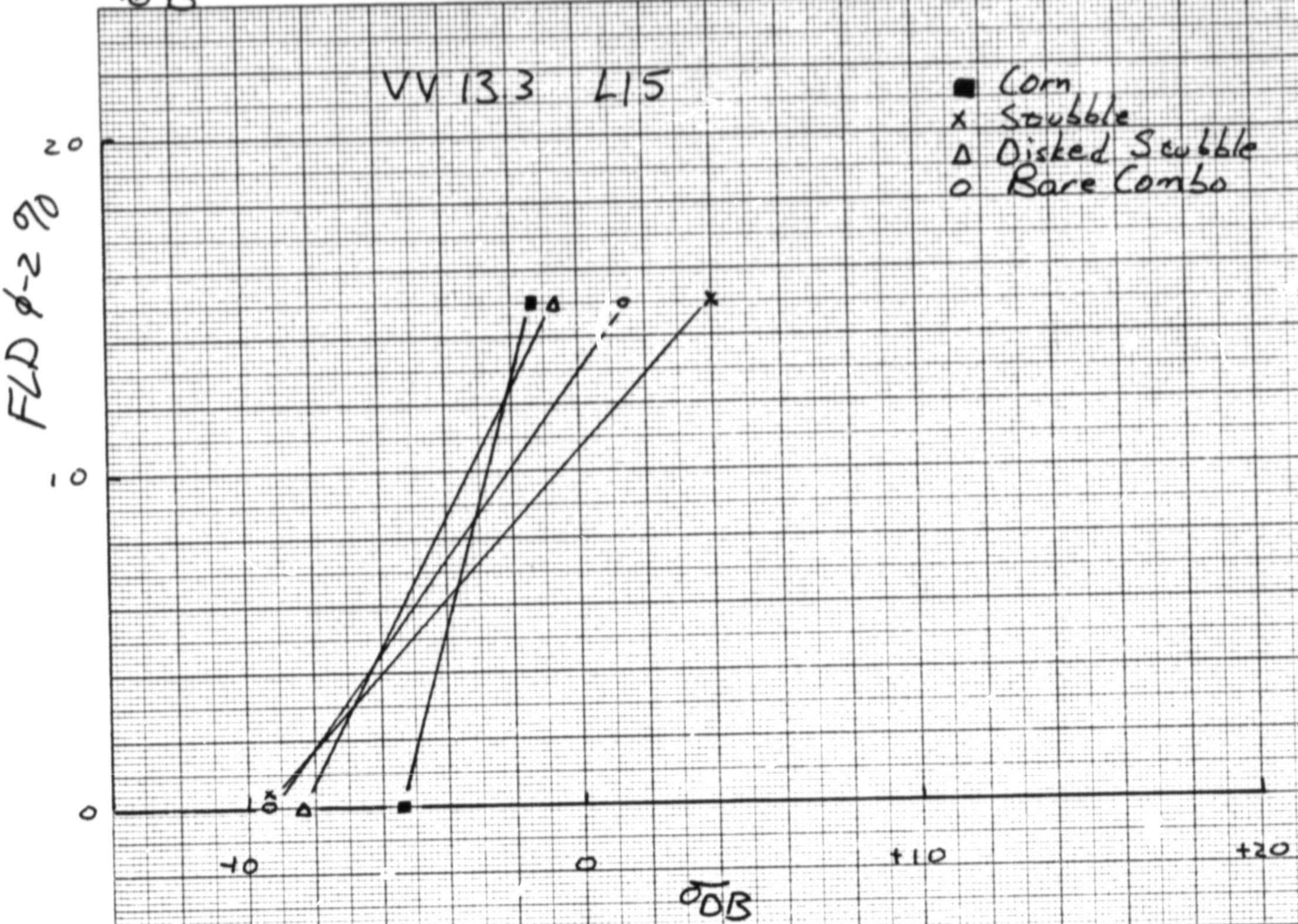


Fig 16B


VV 13.3 L15
Corn
Stubble
Disked Stubble
Bare Combo
FLD ϕ-2 %
20
10
0
-10
0
+10
+20
σDB

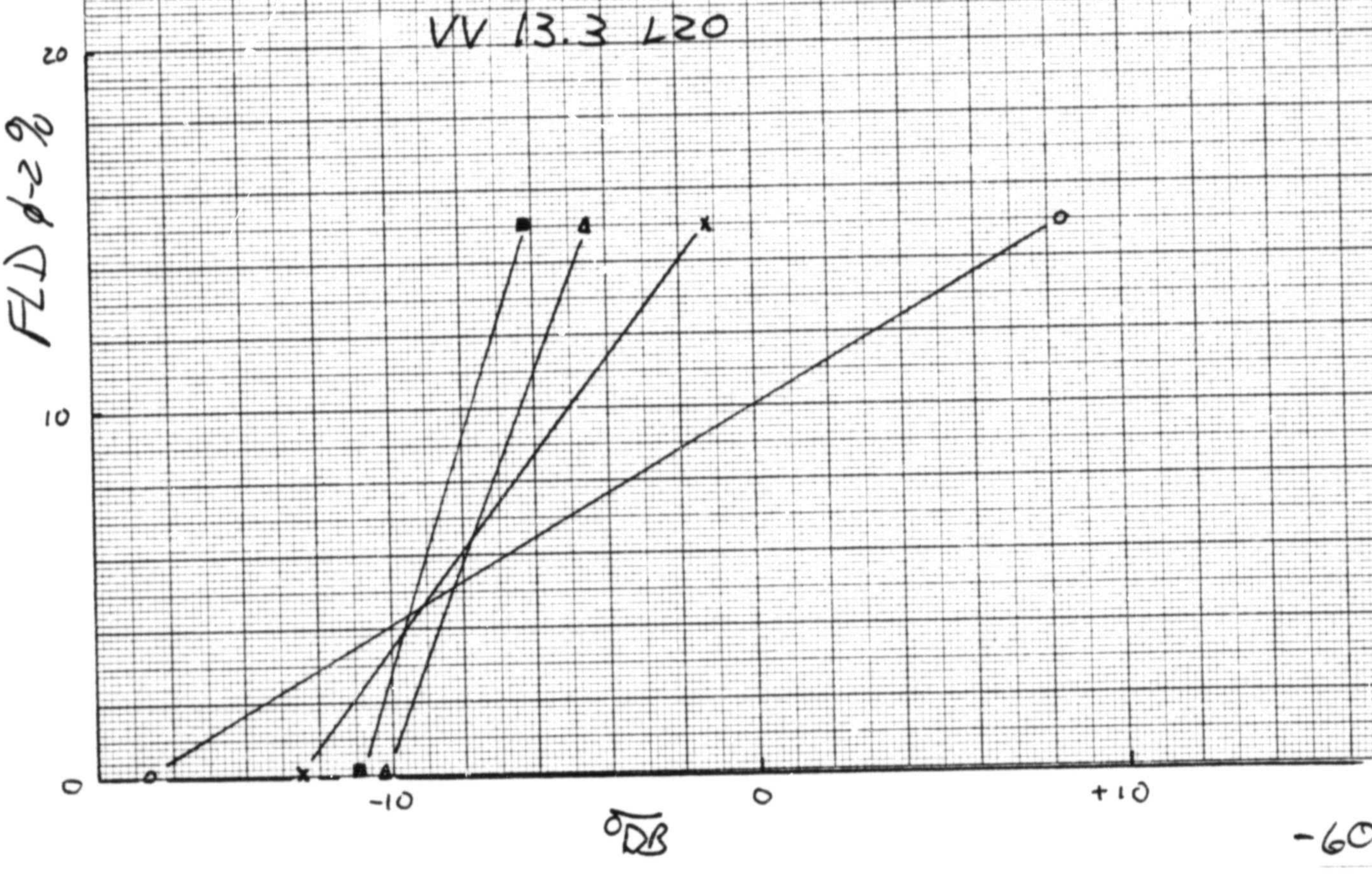

VV 13.3 L20
FLD ϕ-2 %
20
10
0
-10
0
+10
σDB

Fig 16C

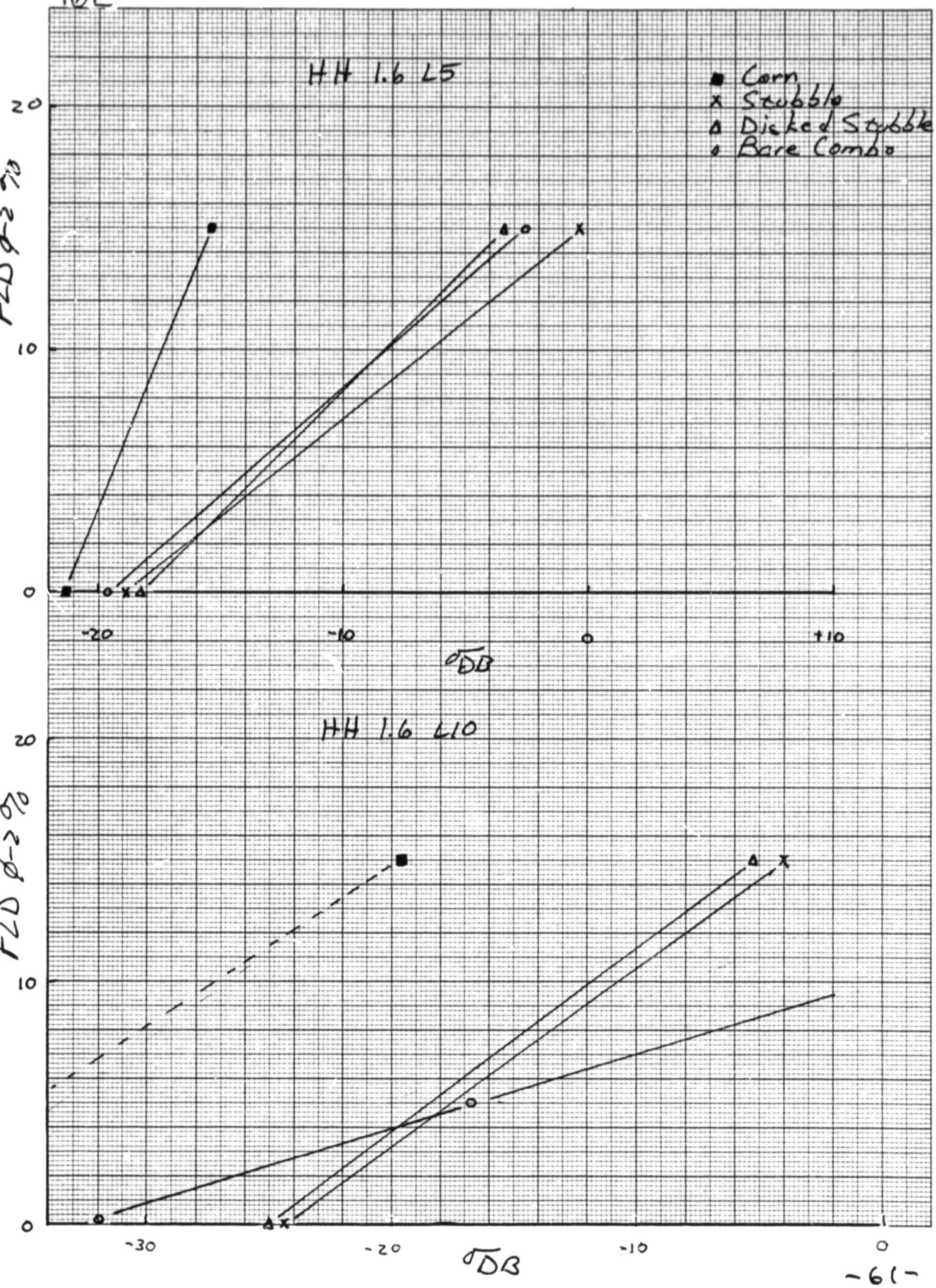

HH 1.6 L5
Corn
Stubble
Disked Stubble
Bare Combo
FLD ϕ-2 %
20
10
0
-20
-10
0
+10
σDB
HH 1.6 L10
FLD ϕ-2 %
20
10
0
-30
-20
-10
0
σDB

Fig 16D

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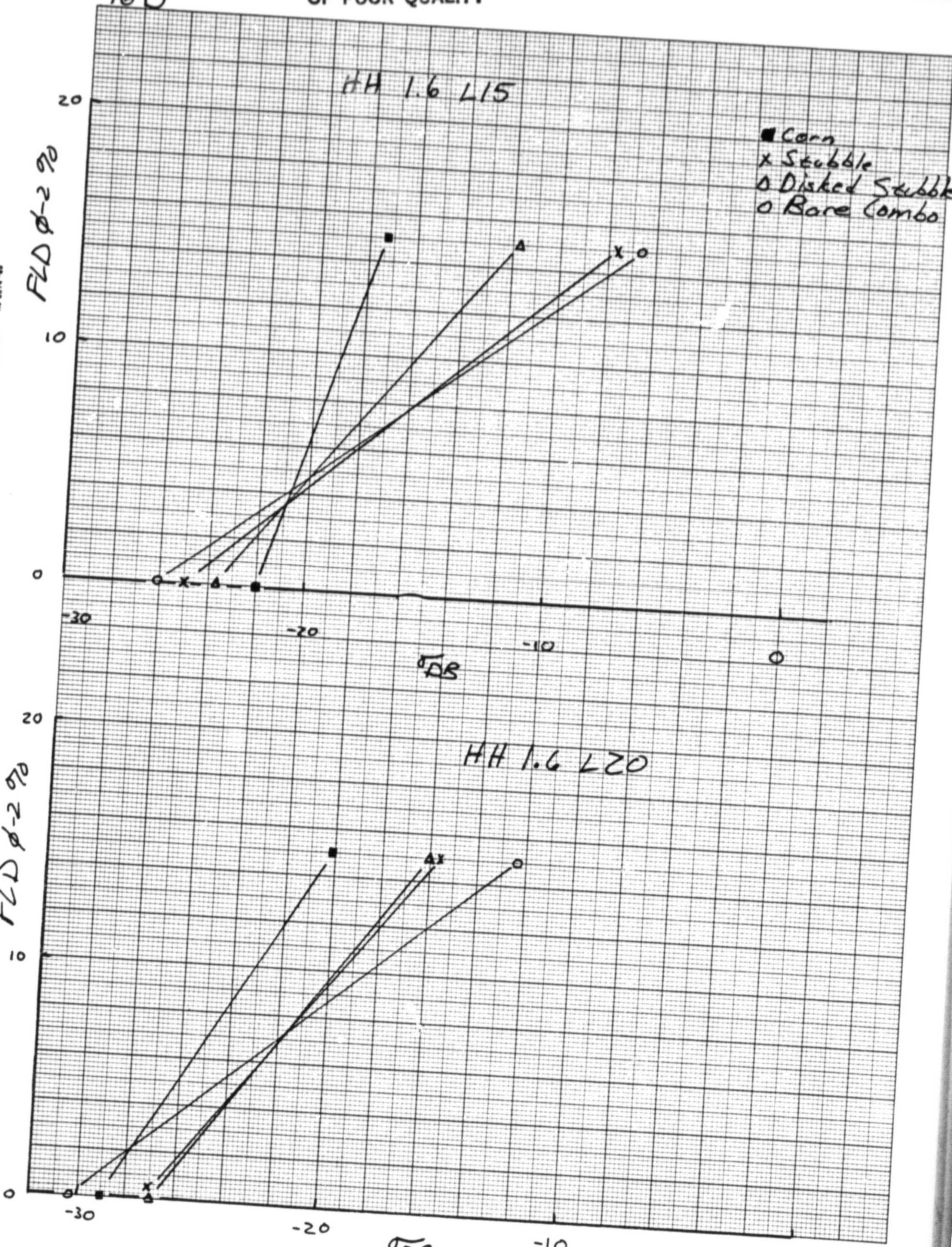
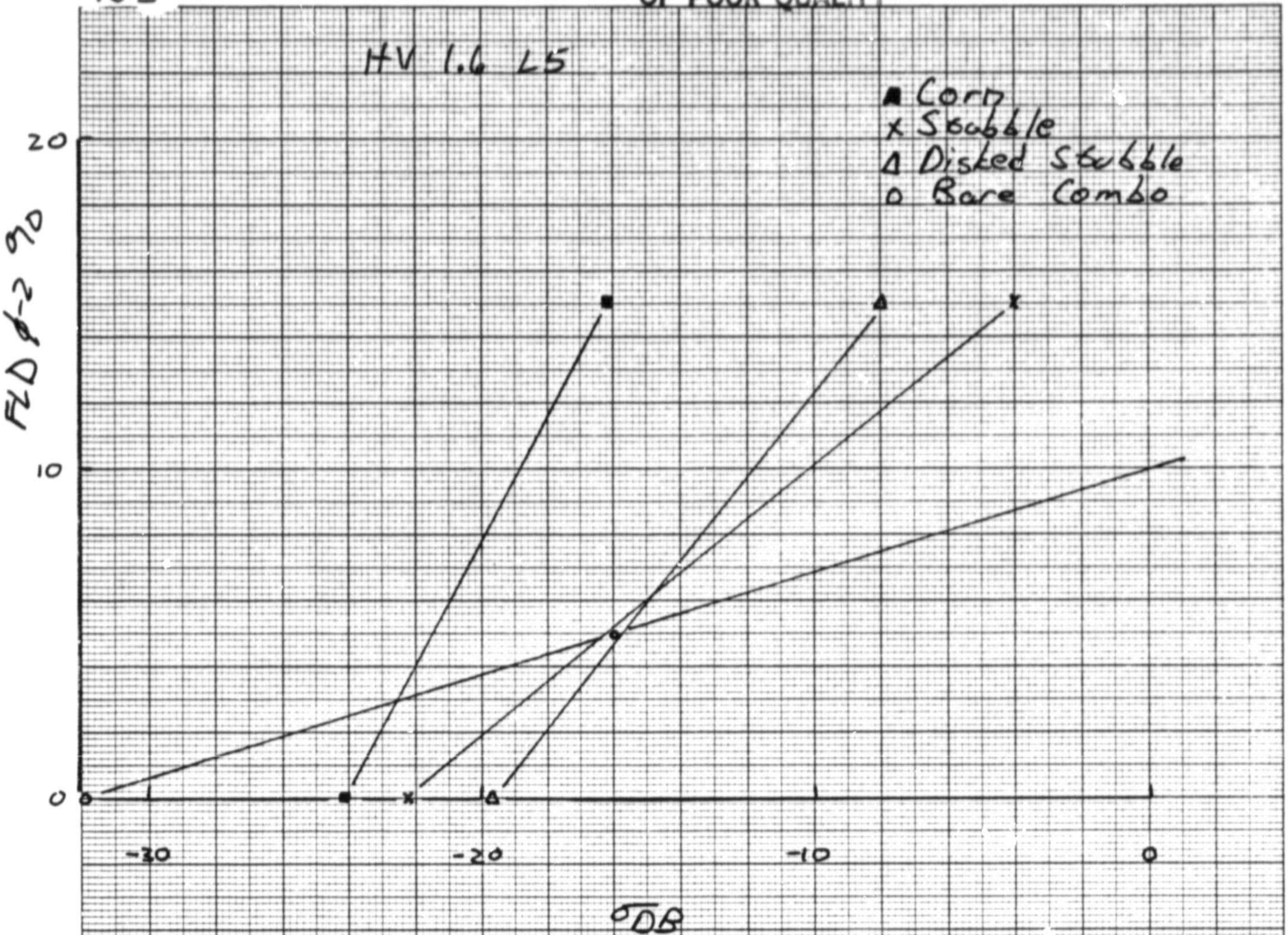


Fig 16E


HV 1.6 L5
■ Corn
x Stubble
Δ Disked Stubble
o Bare Combo
FLD φ-2 90
20
10
0
-30
-20
-10
0
σDB

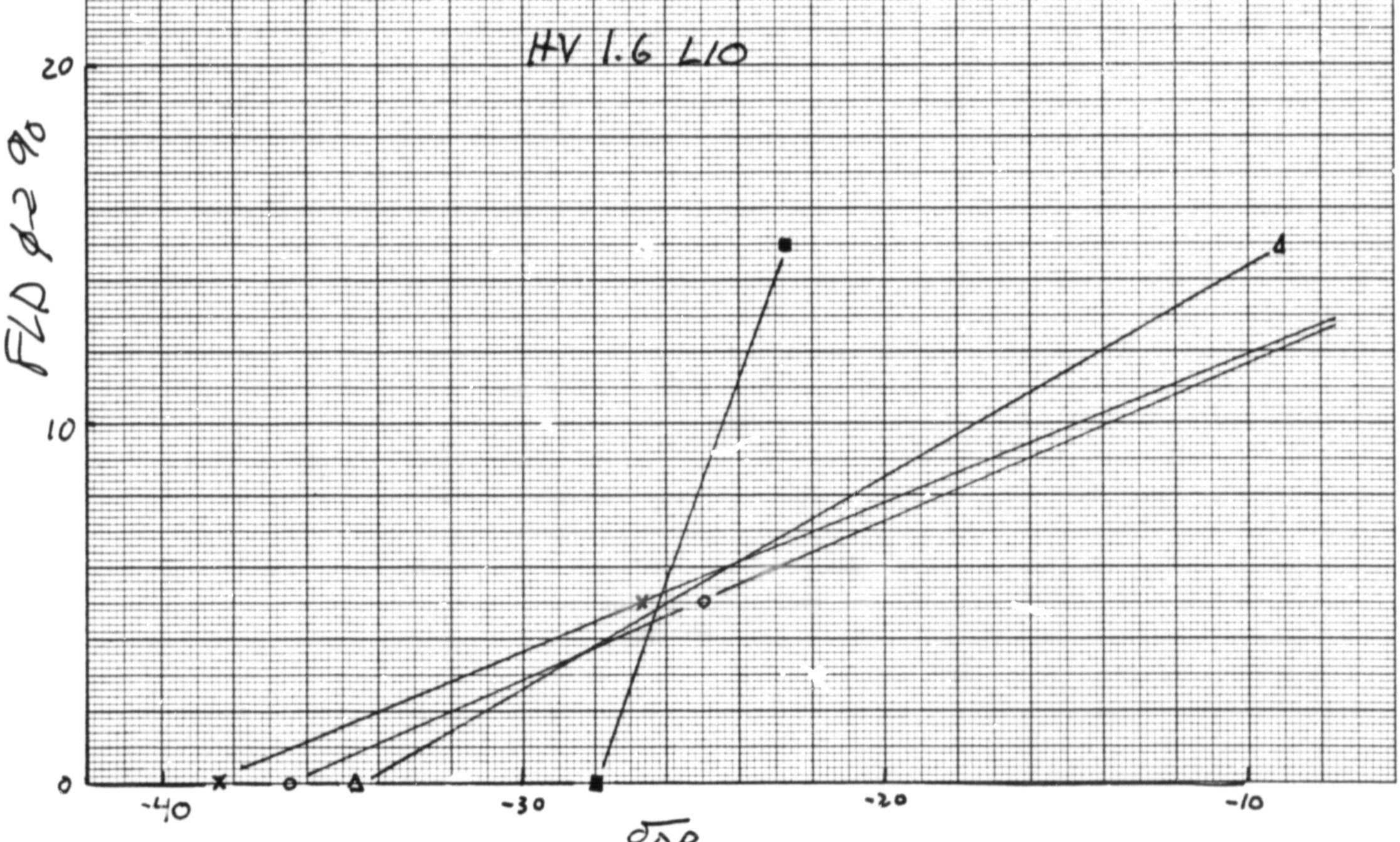

HV 1.6 L10
FLD φ-2 90
20
10
0
-40
-30
-20
-10
σDB

Fig 16F

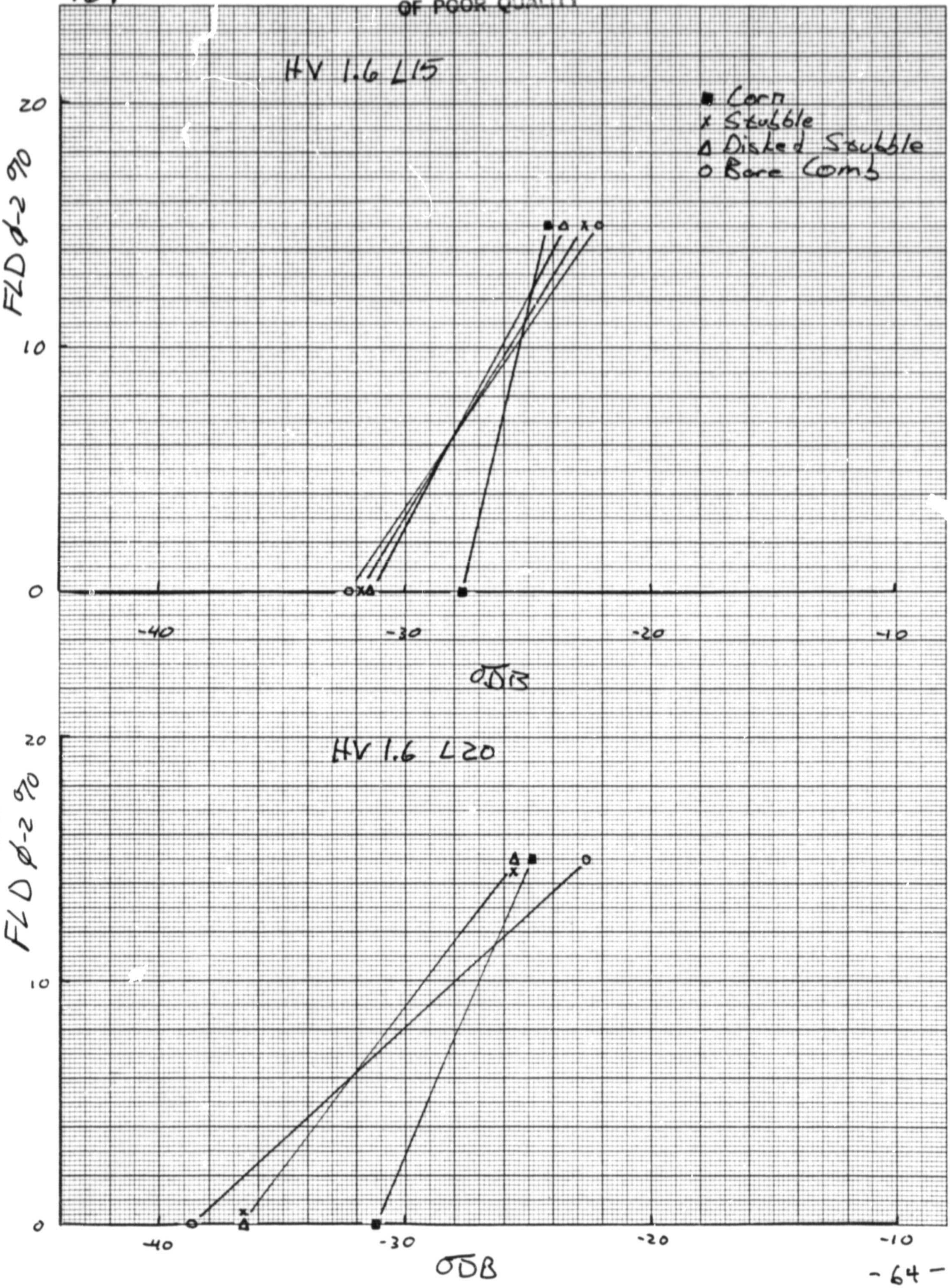

HV 1.6 ∠15
■ Corn
x Stubble
Δ Disked Stubble
o Bare Comb
FLD φ-2 %
20
10
0
-40
-30
-20
-10
σDB
HV 1.6 ∠20
FLD φ-2 %
20
10
0
-40
-30
-20
-10
σDB

Fig 16G

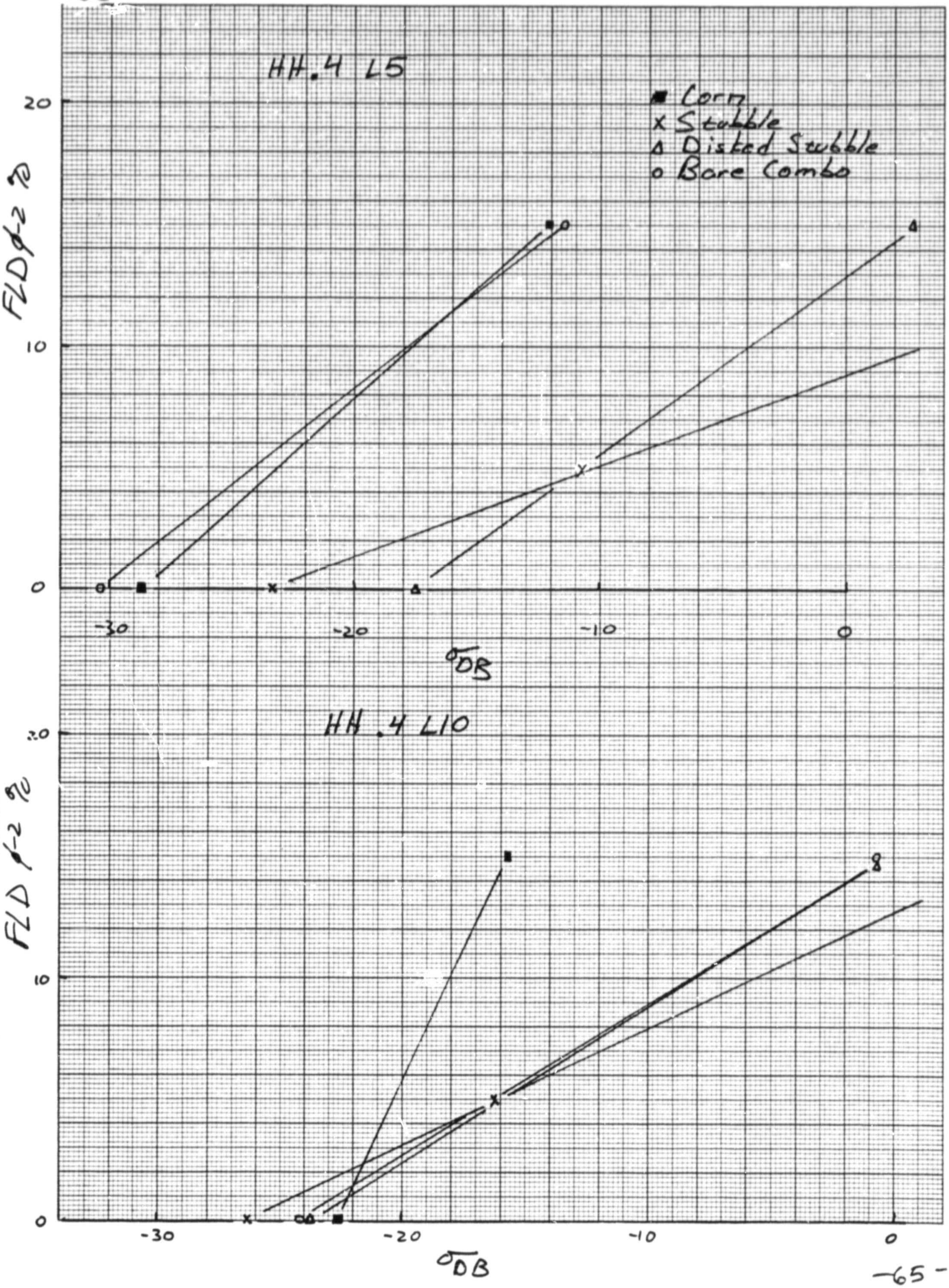

HH .4 L5
■ Corn
x Stubble
Δ Disked Stubble
o Bare Combo
FLD ϕ-2 %
20
10
0
-30
-20
-10
0
σ_{DB}
HH .4 L10
FLD ϕ-2 %
20
10
0
-30
-20
-10
0
σ_{DB}

Fig 16H

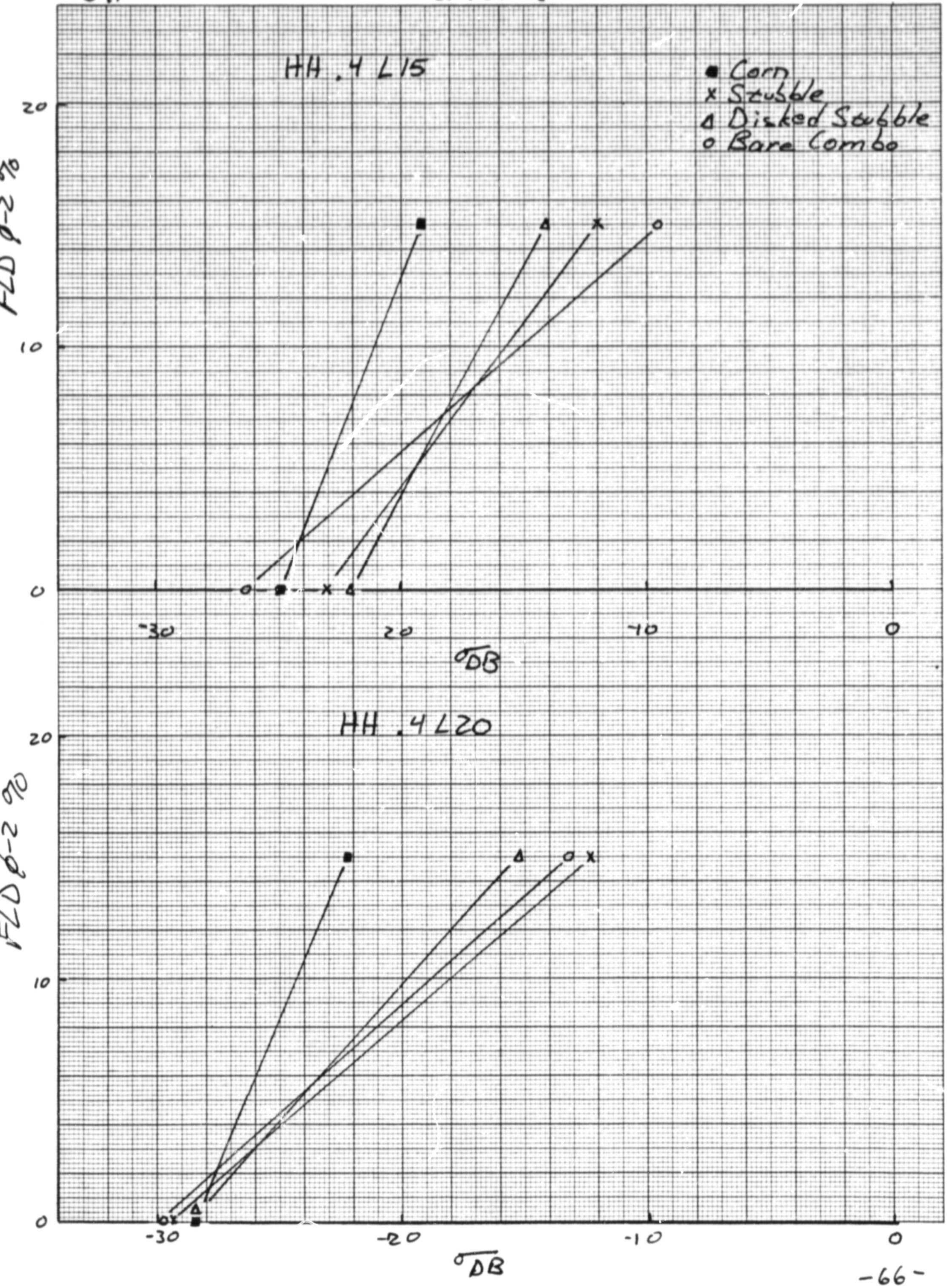

HH .4 ∠15
■ Corn
x Stubble
Δ Disked Stubble
o Bare Combo
FLD φ-2 %
20
10
0
-30
20
-10
0
σDB
HH .4 ∠20
FLD φ-2 %
20
10
0
-30
-20
-10
0
σDB

Fig 16I

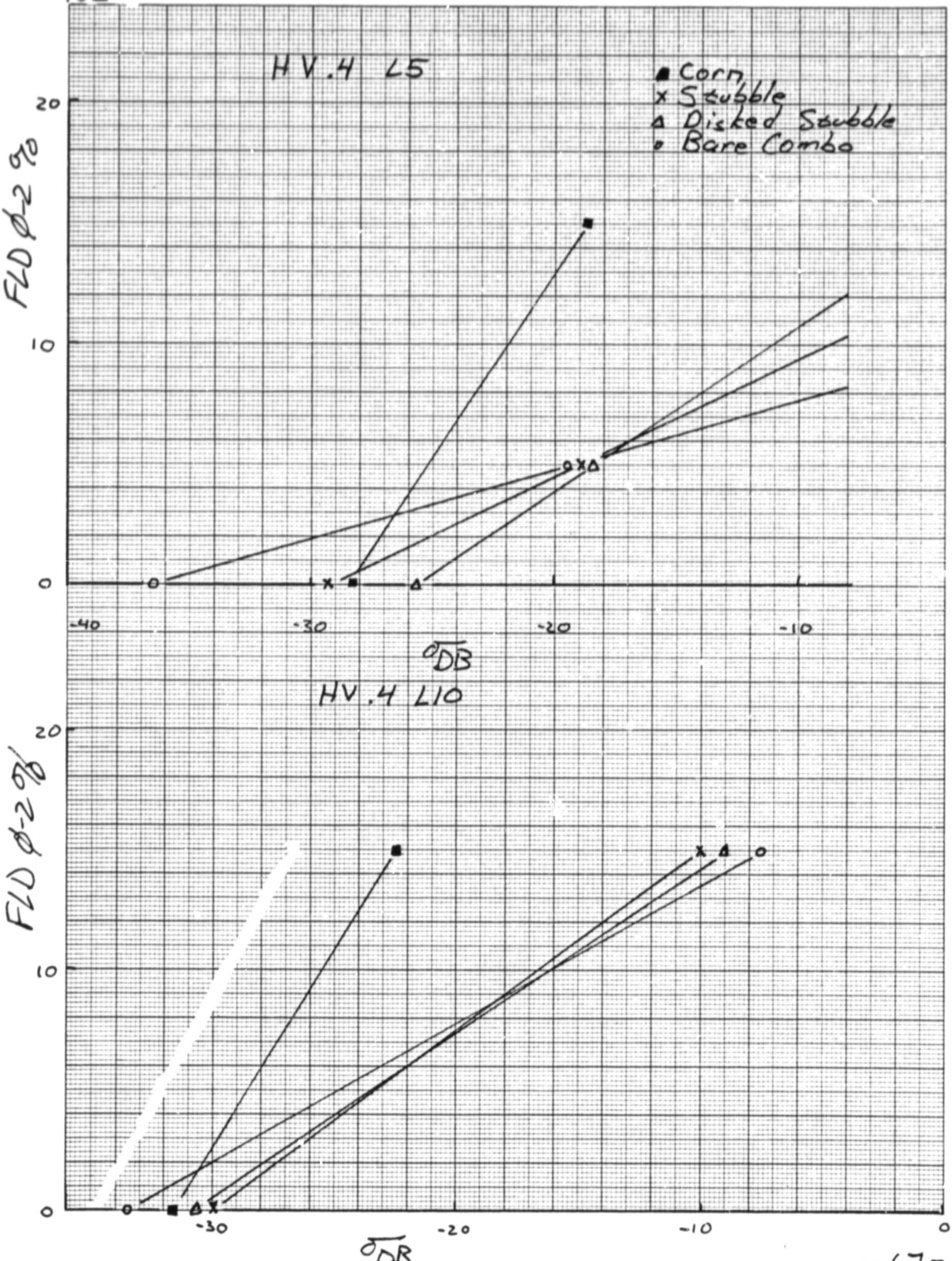
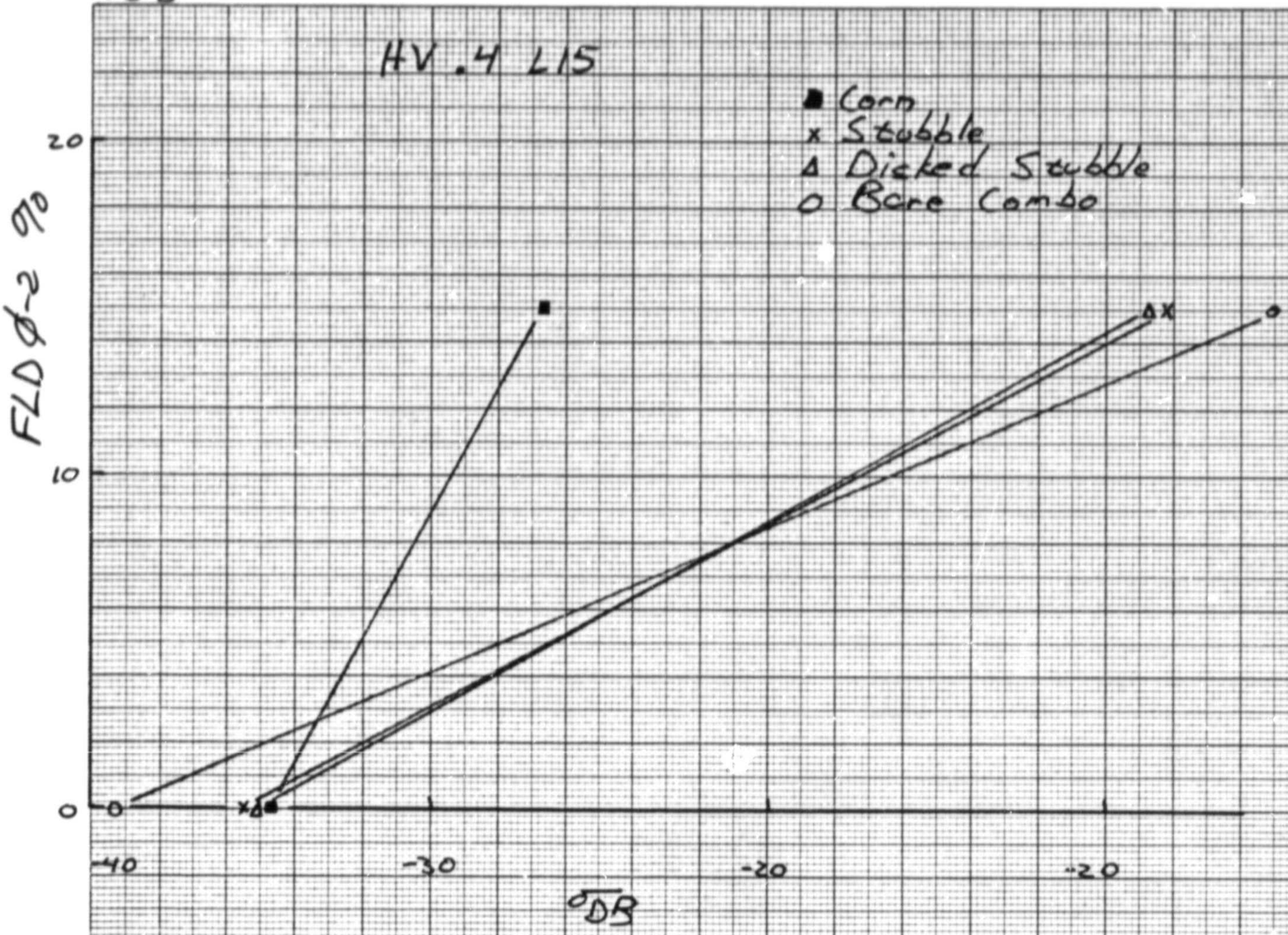

HV .4 ∠5
Corn
Stubble
Disked Stubble
Bare Combo
FLD φ-2 %
20
10
0
-40
-30
-20
-10
σDB
HV .4 ∠10
FLD φ-2 %
20
10
0
-30
-20
-10
0
σDB

Fig
16J


HV .4 L15
■ Corn
x Stubble
Δ Dicked Stubble
o Bare Combo
FLD ϕ-2 %
20
10
0
-40
-30
-20
-20
σDB

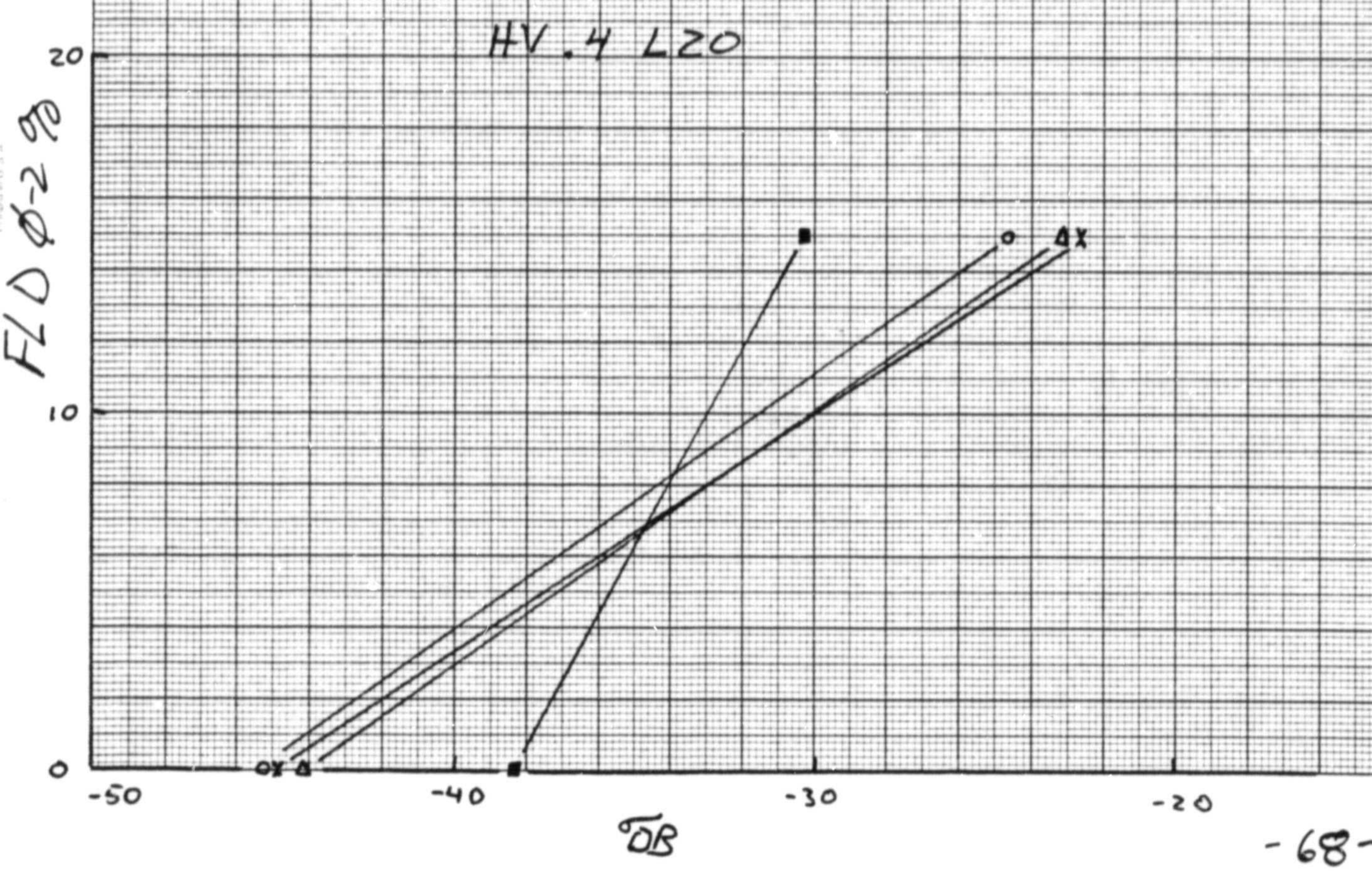

HV .4 L20
FLD ϕ-2 %
20
10
0
-50
-40
-30
-20
σDB

Fig 16K

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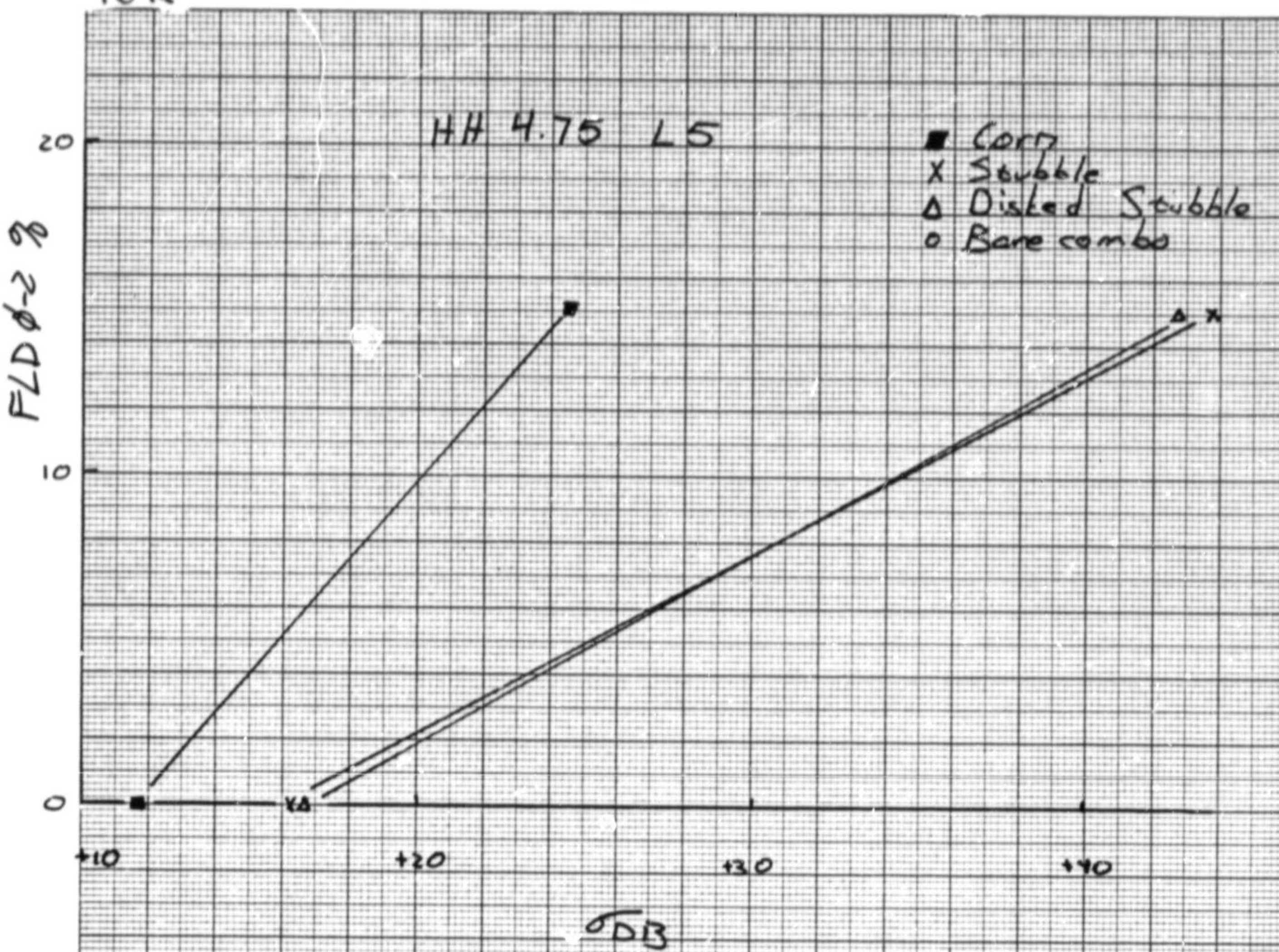


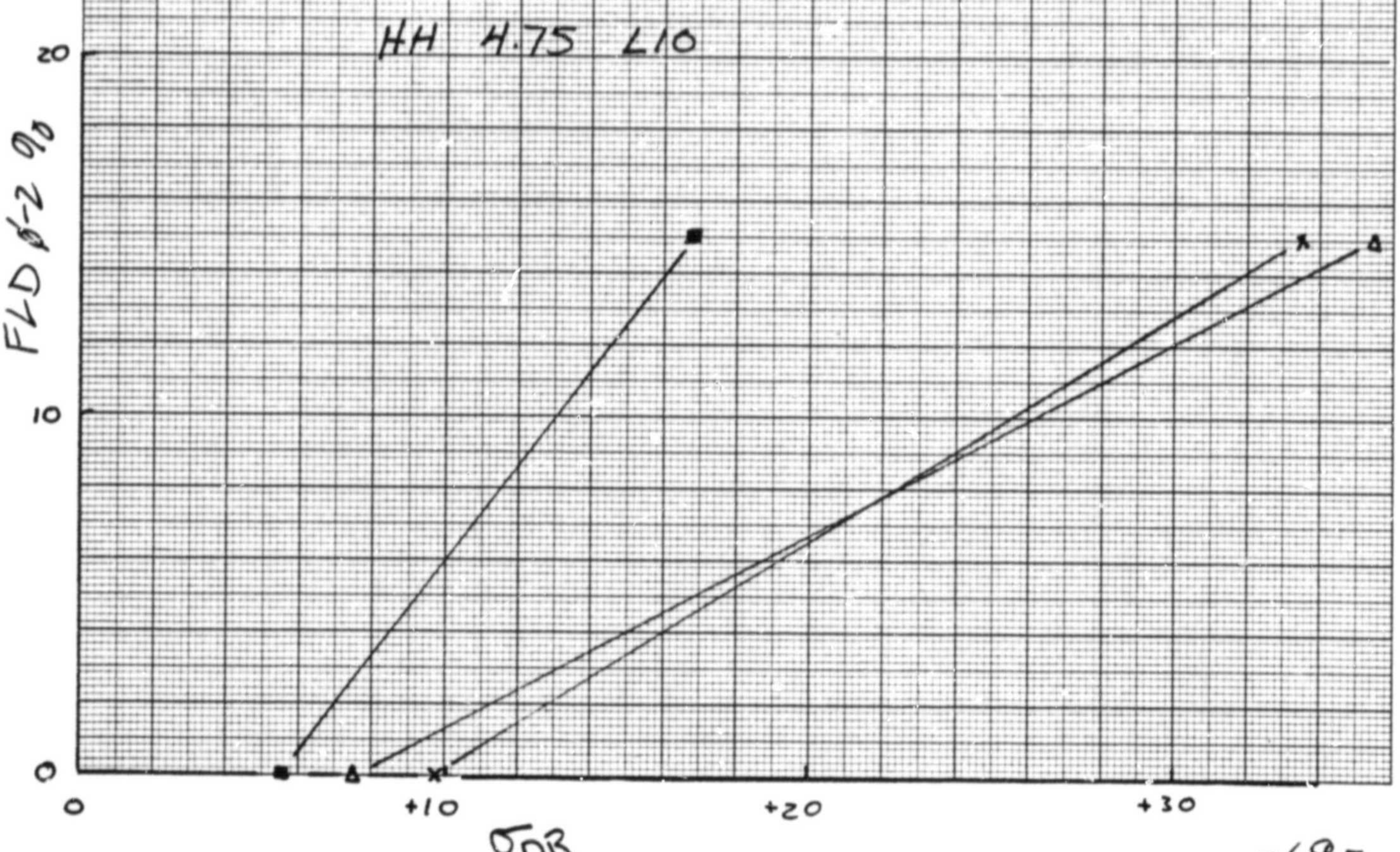
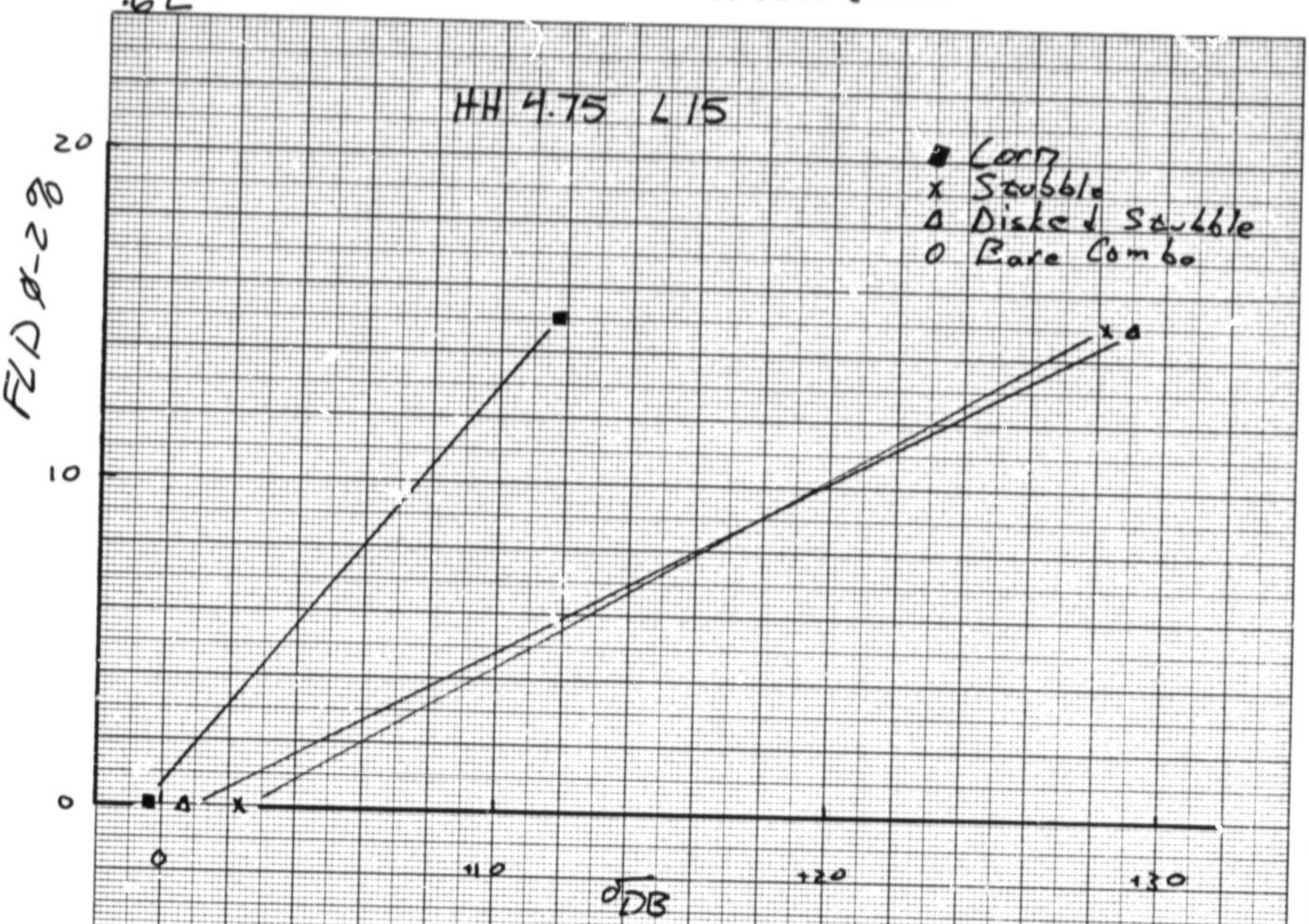


Fig 16L


HH 4.75 ∠15
■ Corn
x Stubble
Δ Disked Stubble
0 Bare Combo
FLD ϕ-2 %
20
10
0
0
+10
+20
+30
σDB

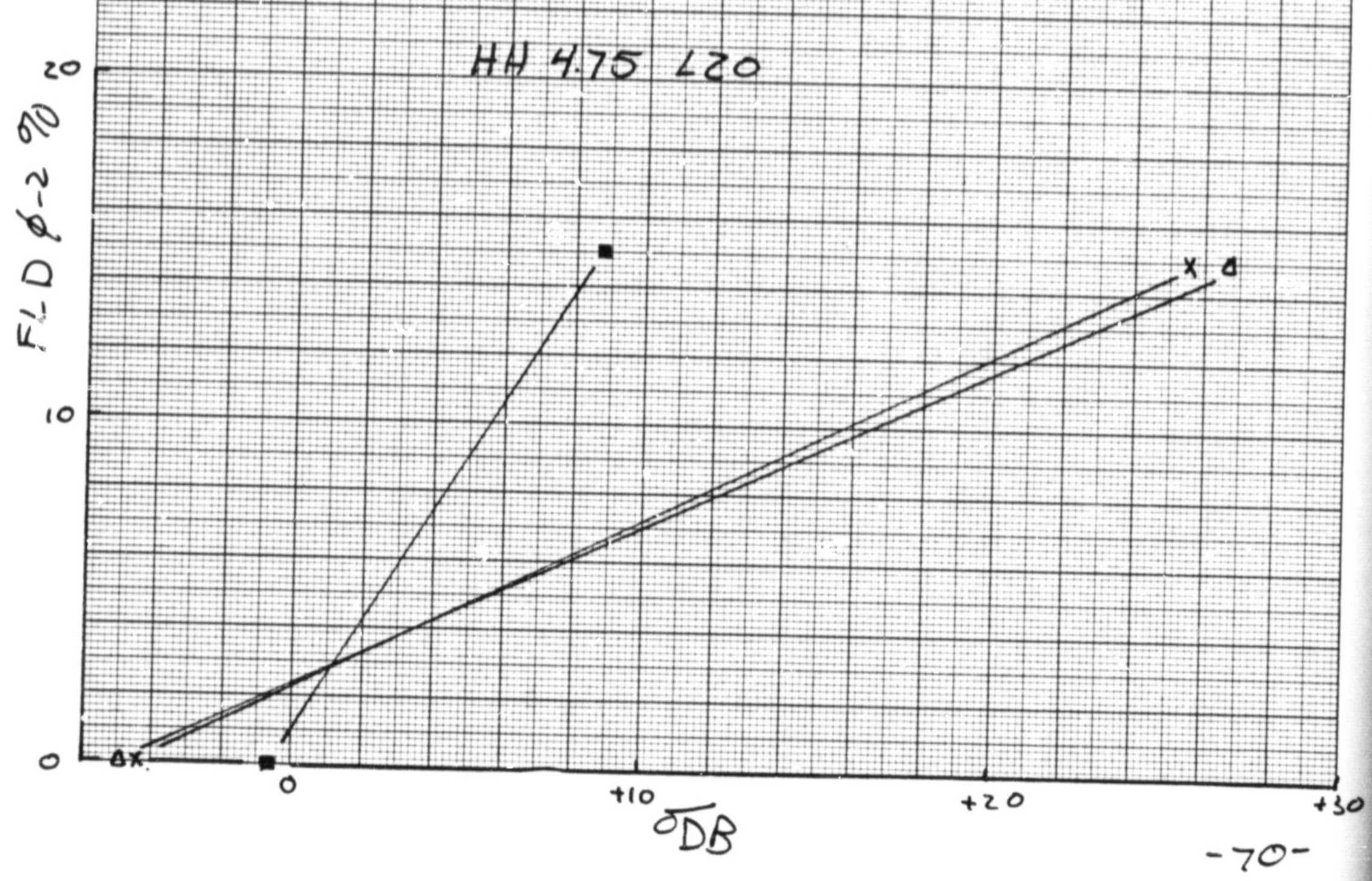

HH 4.75 ∠20
FLD ϕ-2 %
20
10
0
0
+10
+20
+30
σDB

Fig 16M

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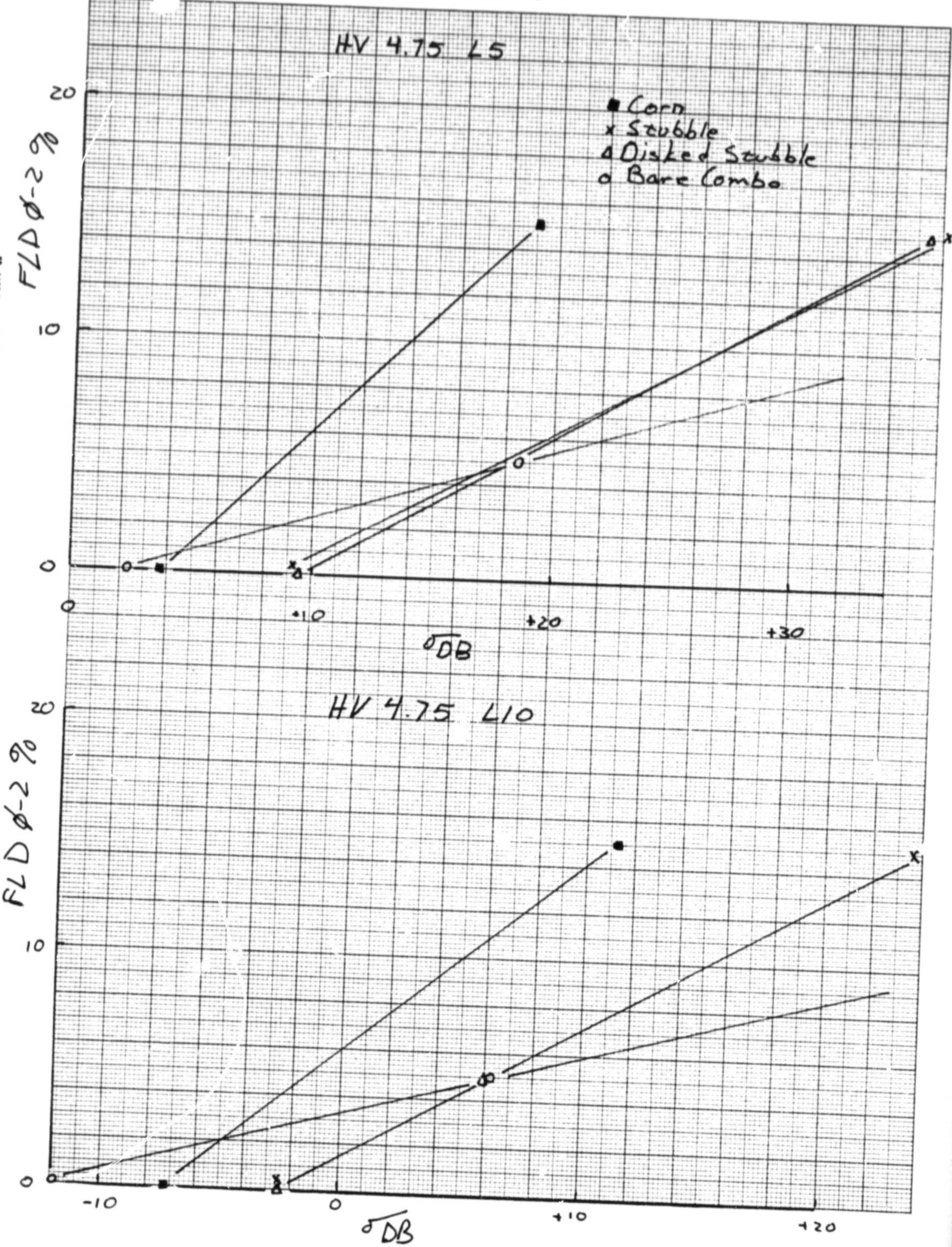
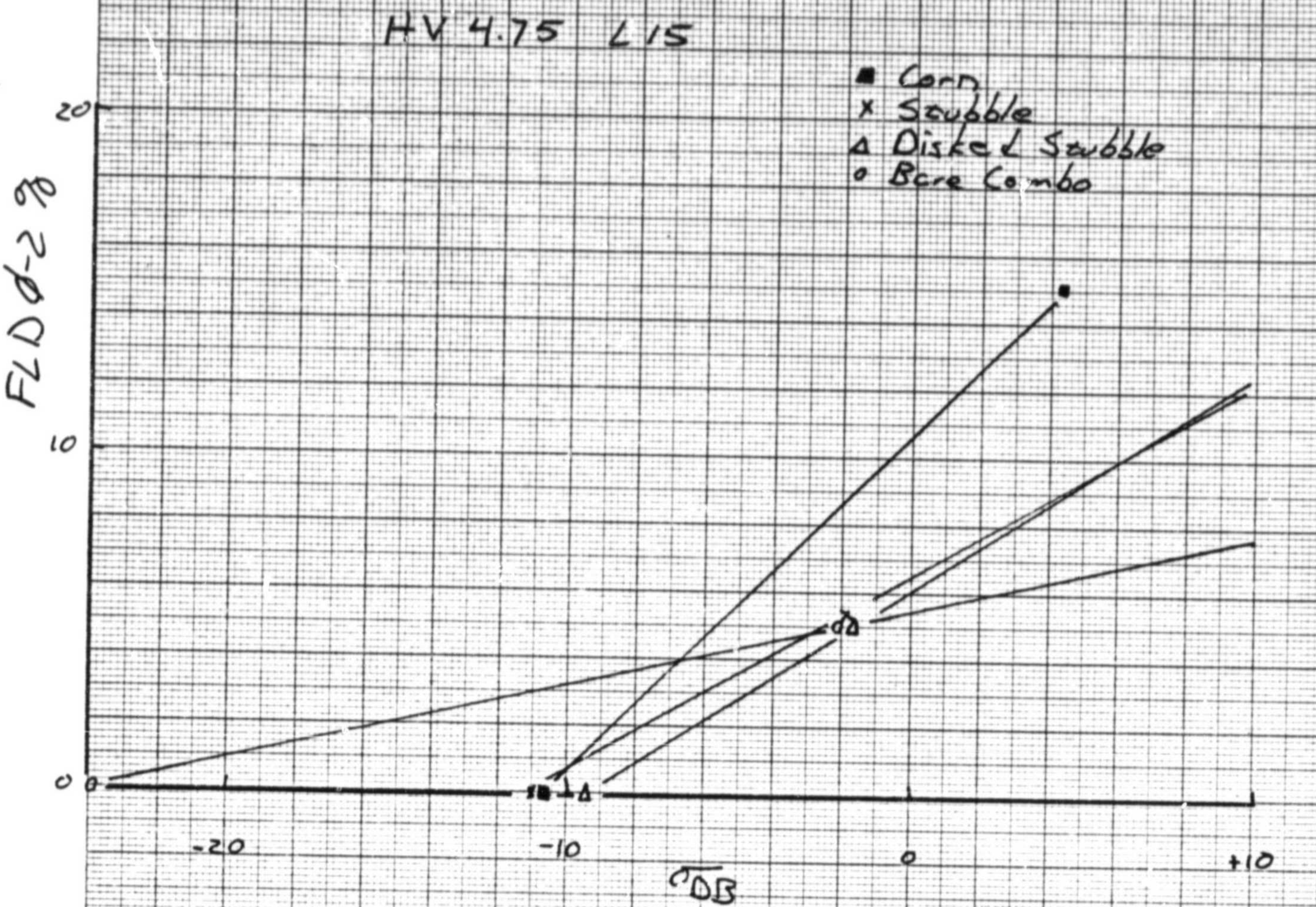


Fig
16 N


HV 4.75 L15
■ Corn
x Stubble
Δ Disked Stubble
o Bare Combo
FLD Ø-2 %
20
10
0
-20
-10
0
+10
σDB

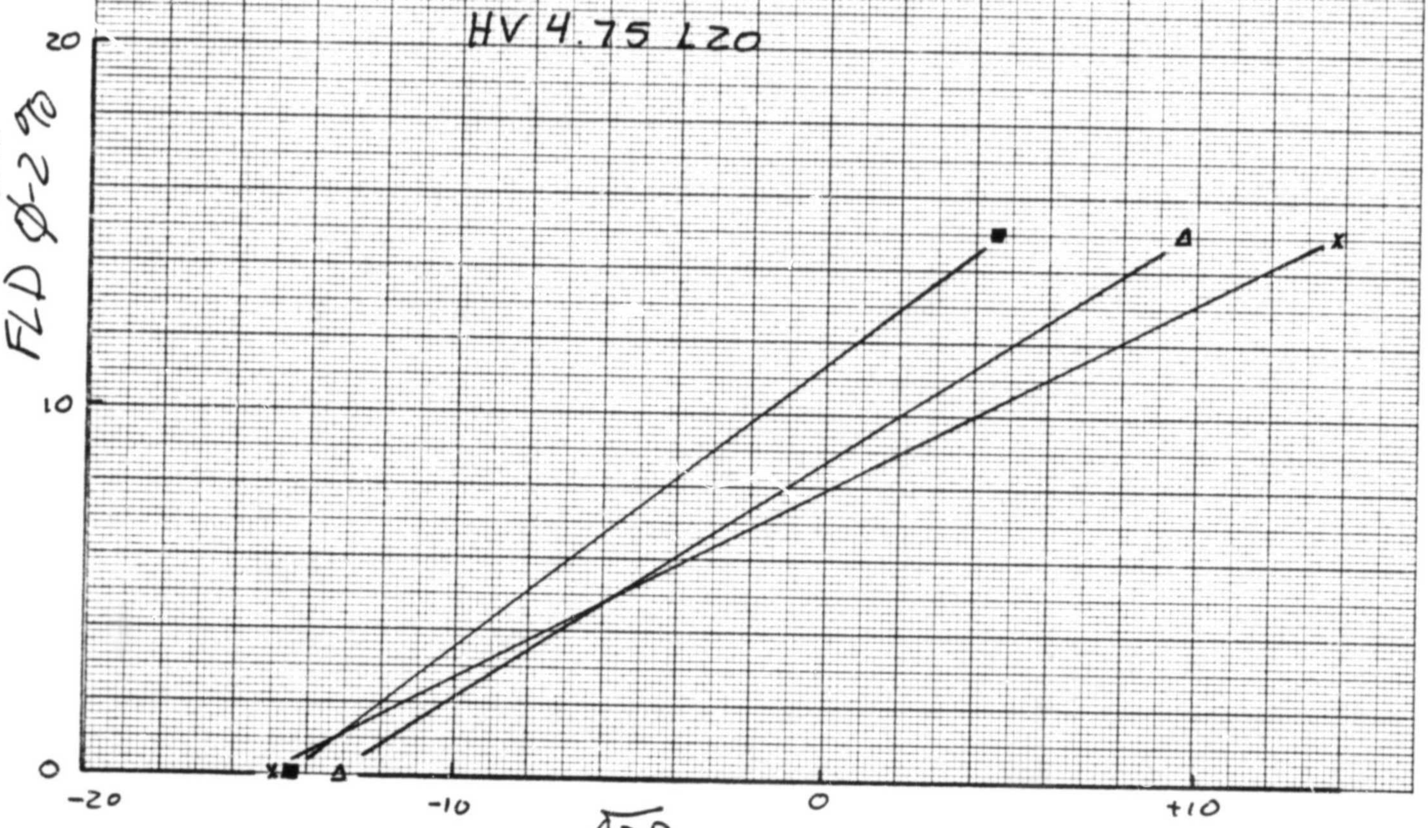

HV 4.75 L20
FLD Ø-2 %
20
10
0
-20
-10
0
+10
σDB

Fig 160

Single Variable Regressions: Comparison of Effects of Cover Type for Prediction of FLD Ø-2

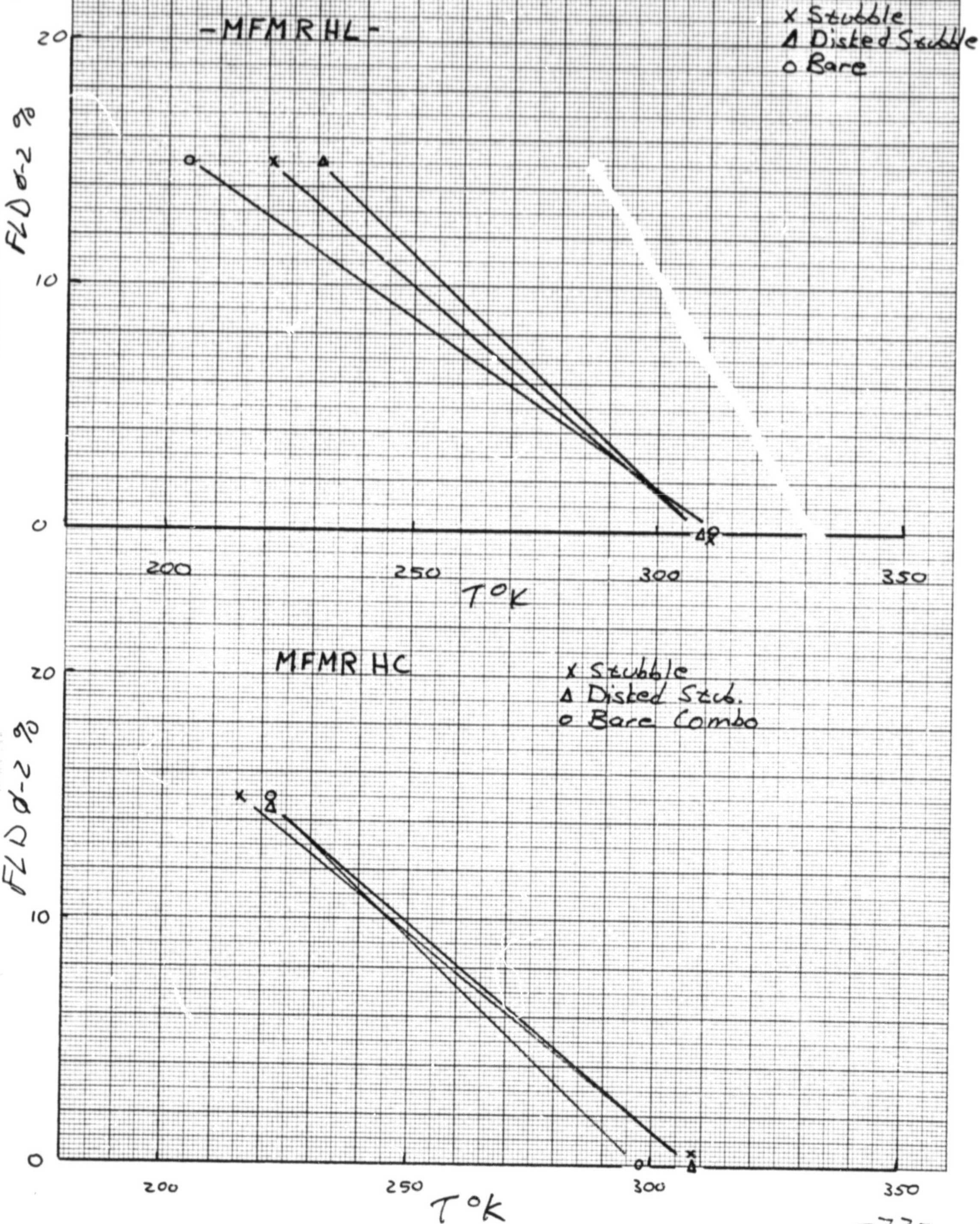


Fig
16 P

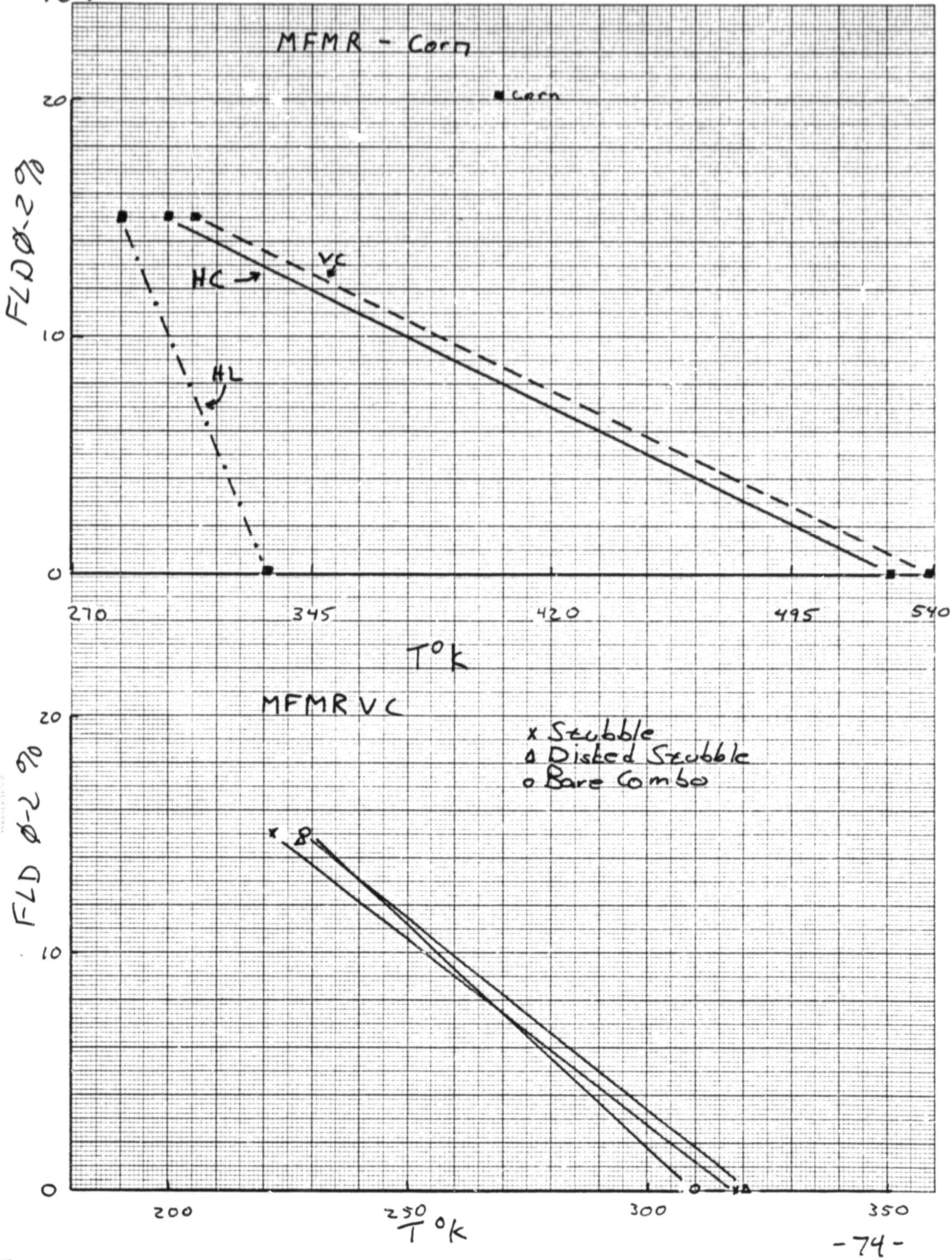

MFMR - Corn
Corn
VC
HC
HL
FLDΦ-2%
20
10
0
270
345
420
495
540
T°K
MFMR VC
x Stubble
Δ Disked Stubble
o Bare Combo
FLD Φ-2%
20
10
0
200
250
300
350
T °K

Fig 17A Standard Error of Estimate for Single Variable Regressions - Sm Ø-2

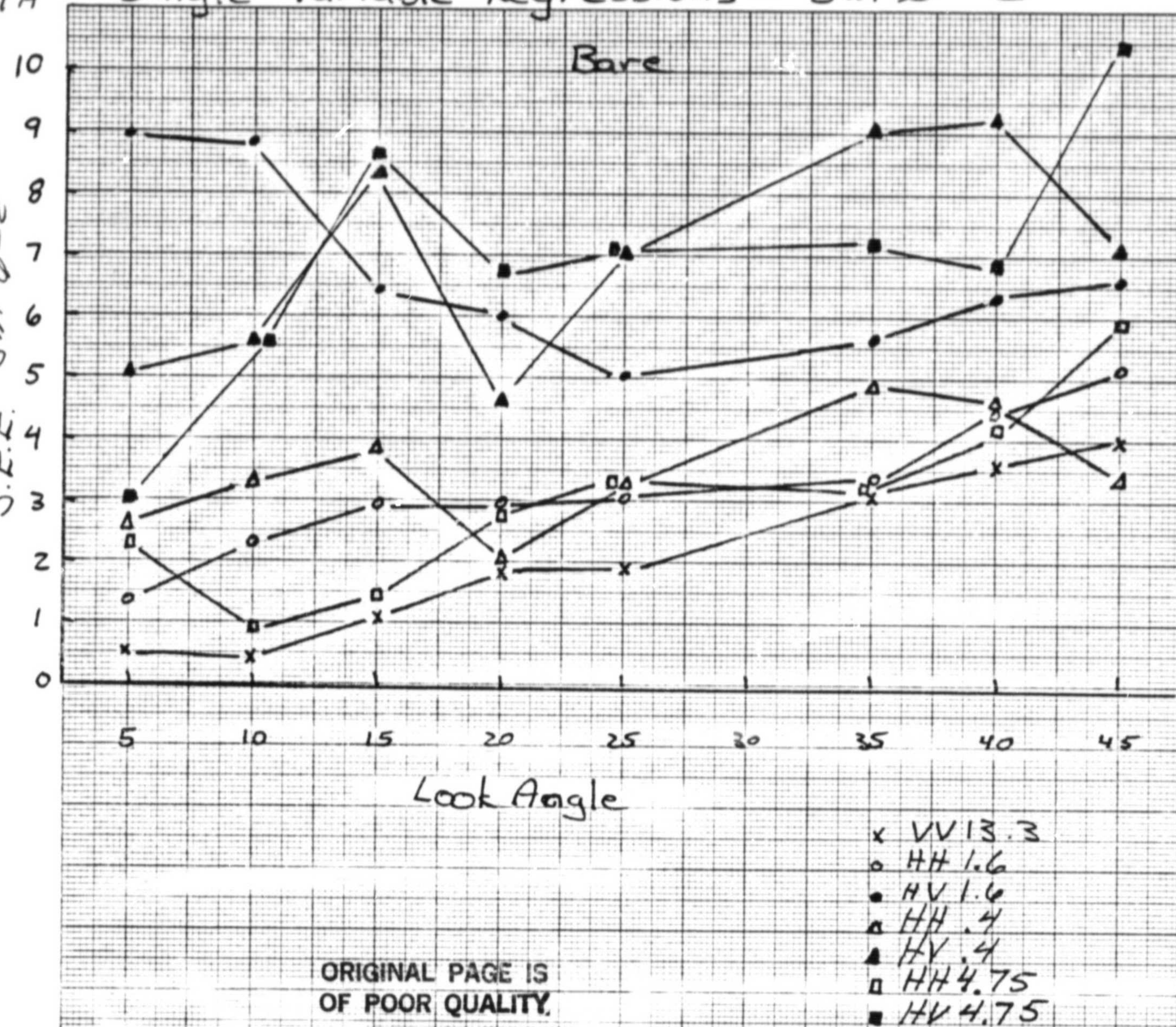


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Fig 17B Standard Error of Estimate for Single Variable Regressions - Soil Ø-2

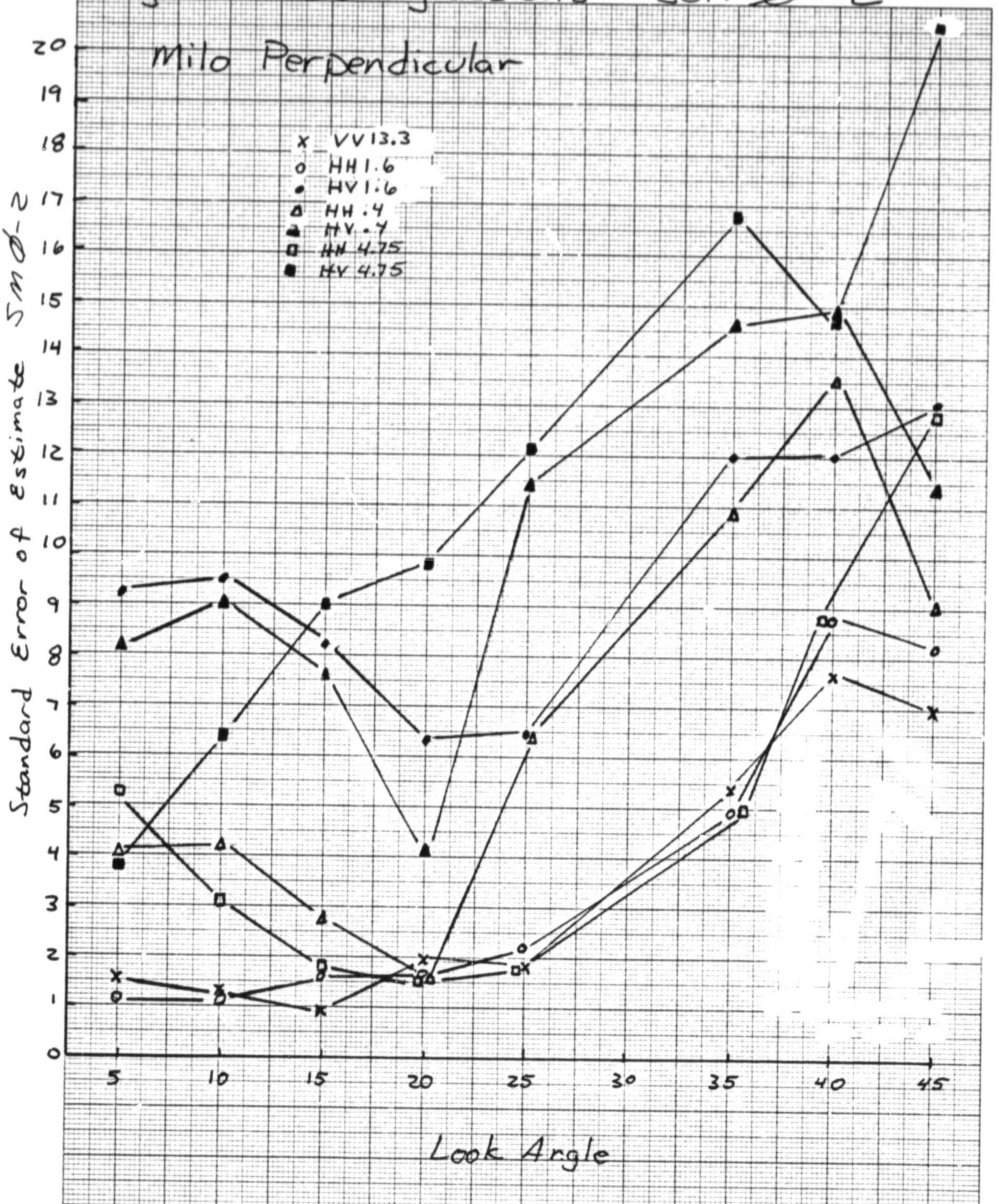

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Fig 17C Standard Error of Estimate for Single Variable Regressions – Sm Ø-2

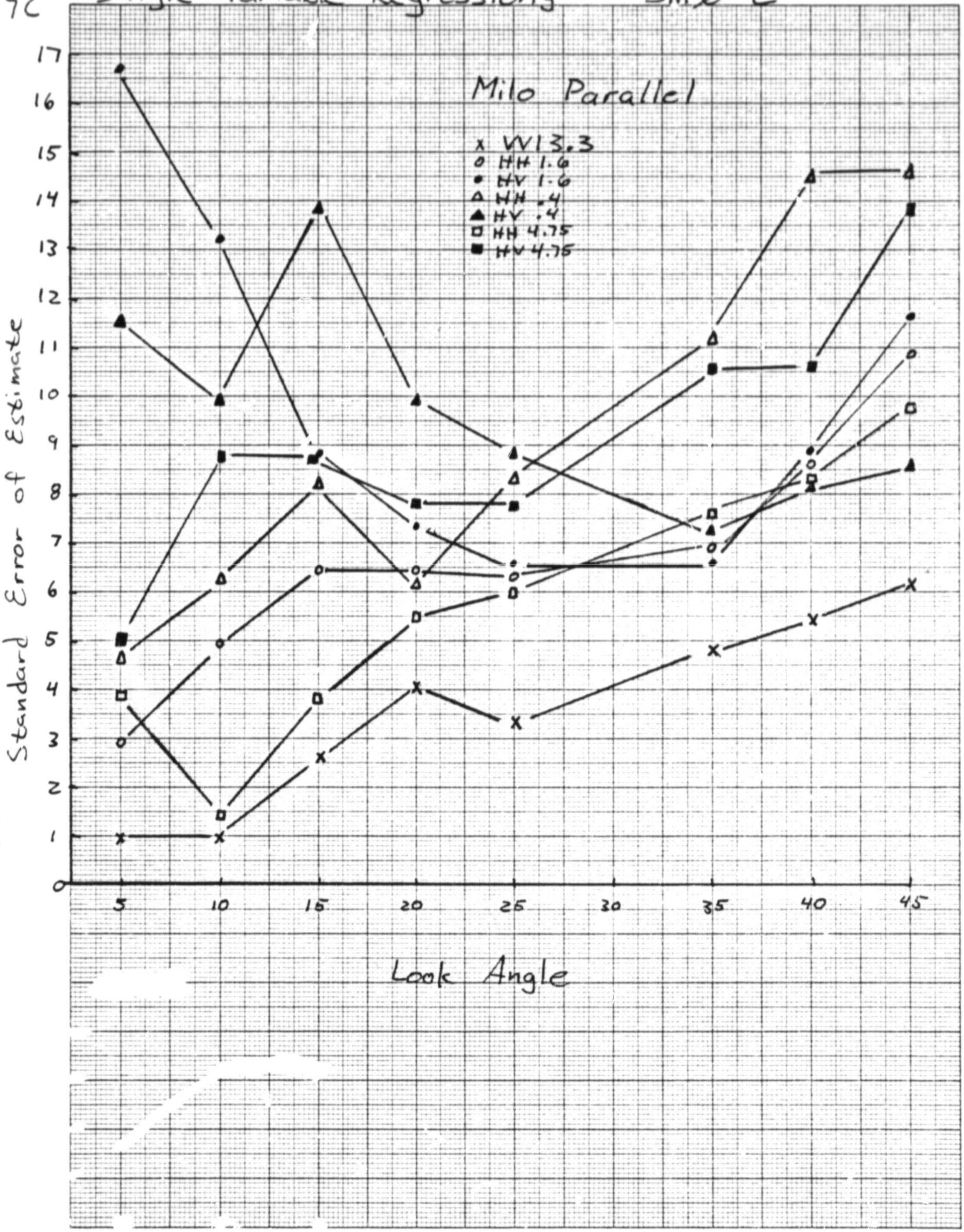

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Fig 17D Standard Error of Estimate for Single Variable Regressions - Sm Ø-2

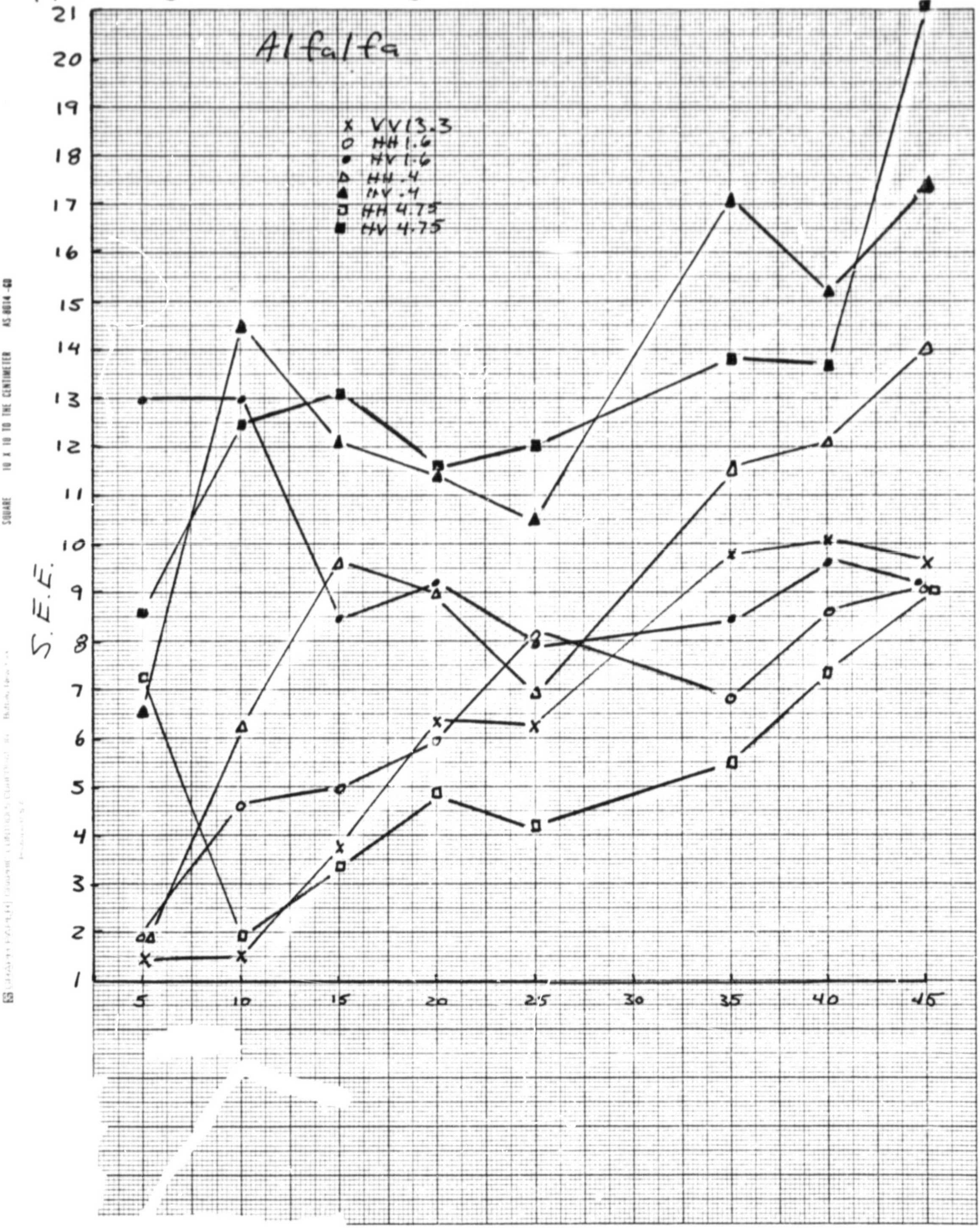

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Fig 17E.

Standard Error of Estimate

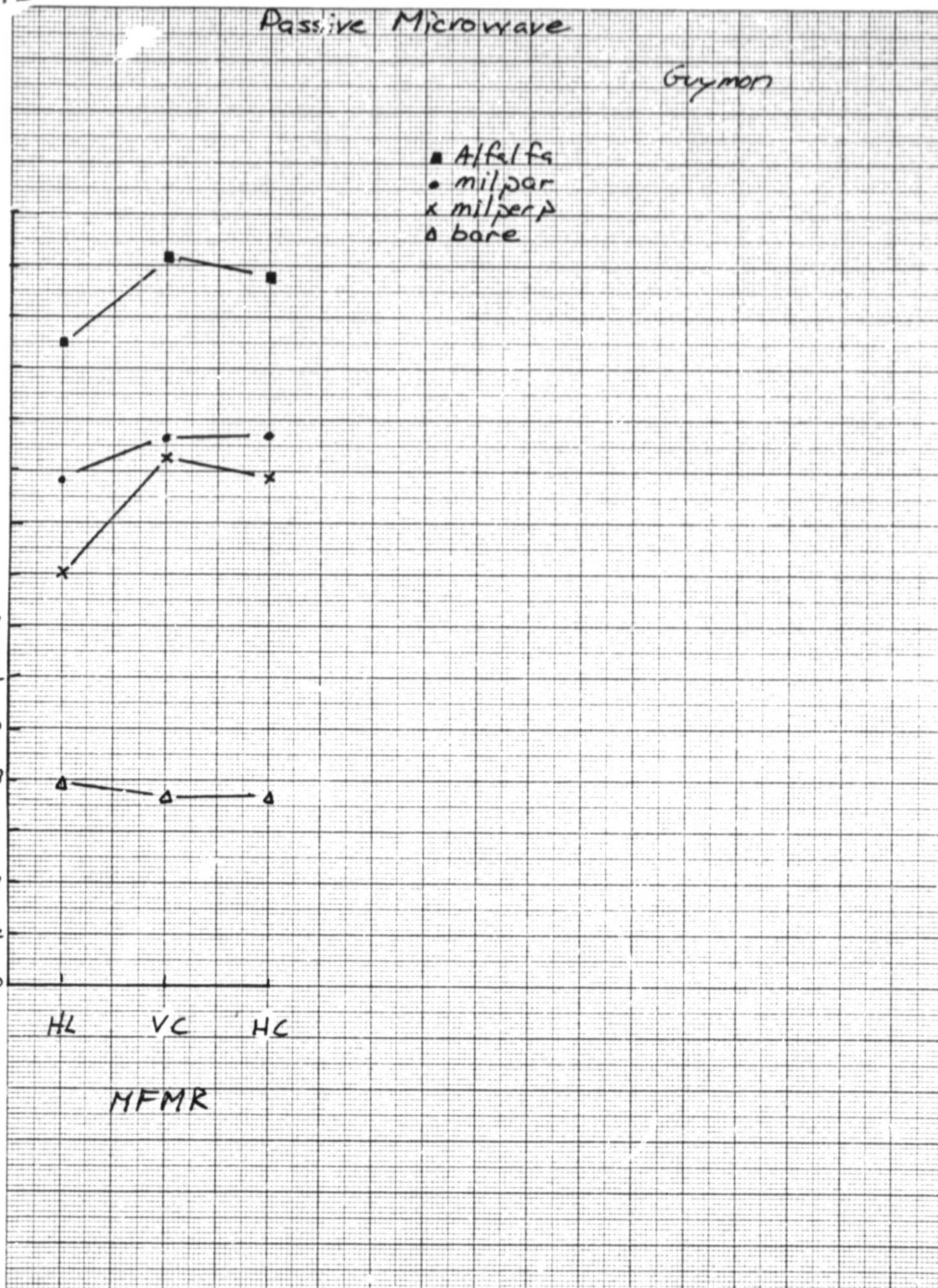

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Fig 18A Standard Error of Estimate for Single Variable Regressions - FLD Ø-2

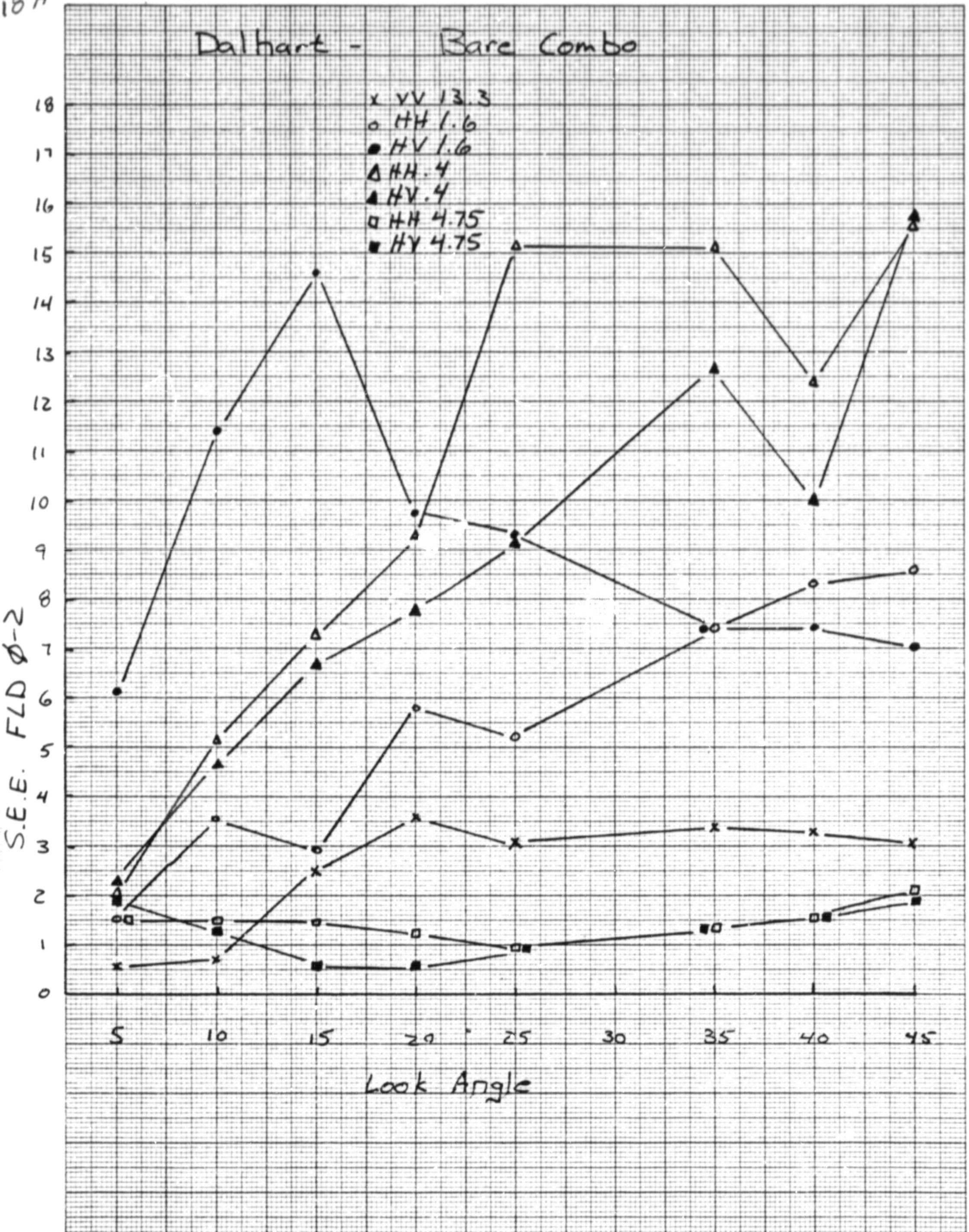

Fig 18B Standard Error of Estimate

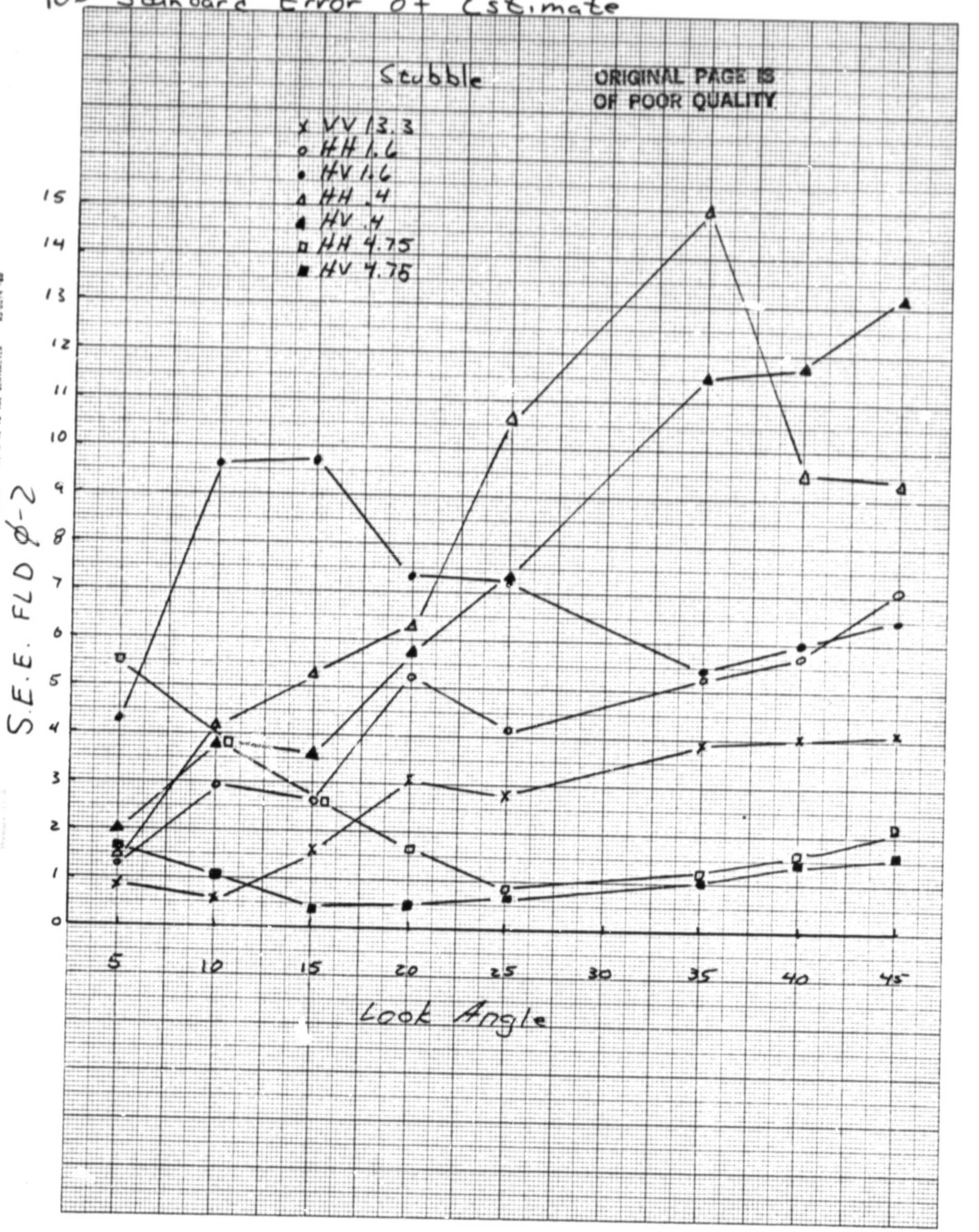

Fig. 18C Standard Error of Estimate

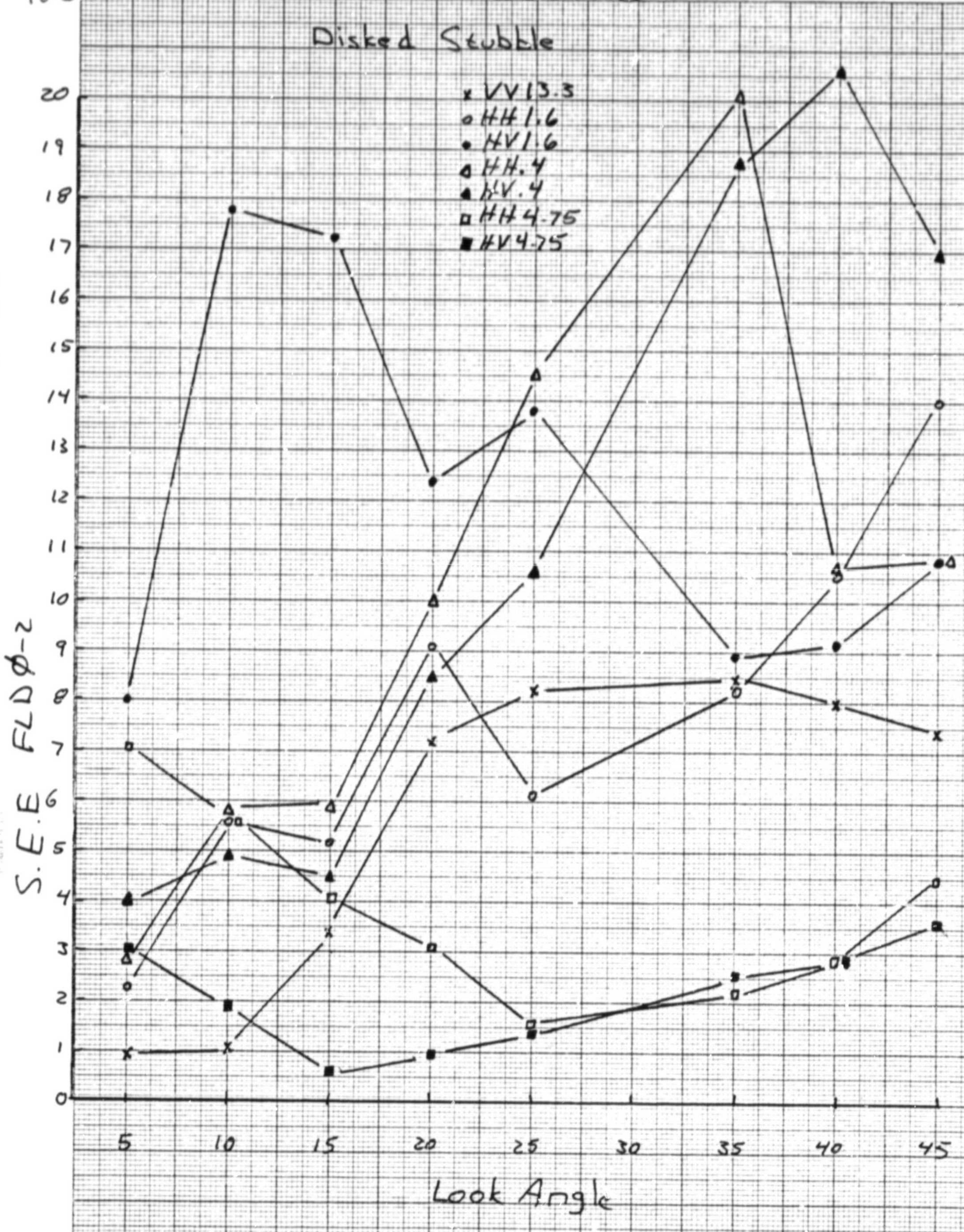

Fig 18D Standard Error of Estimate

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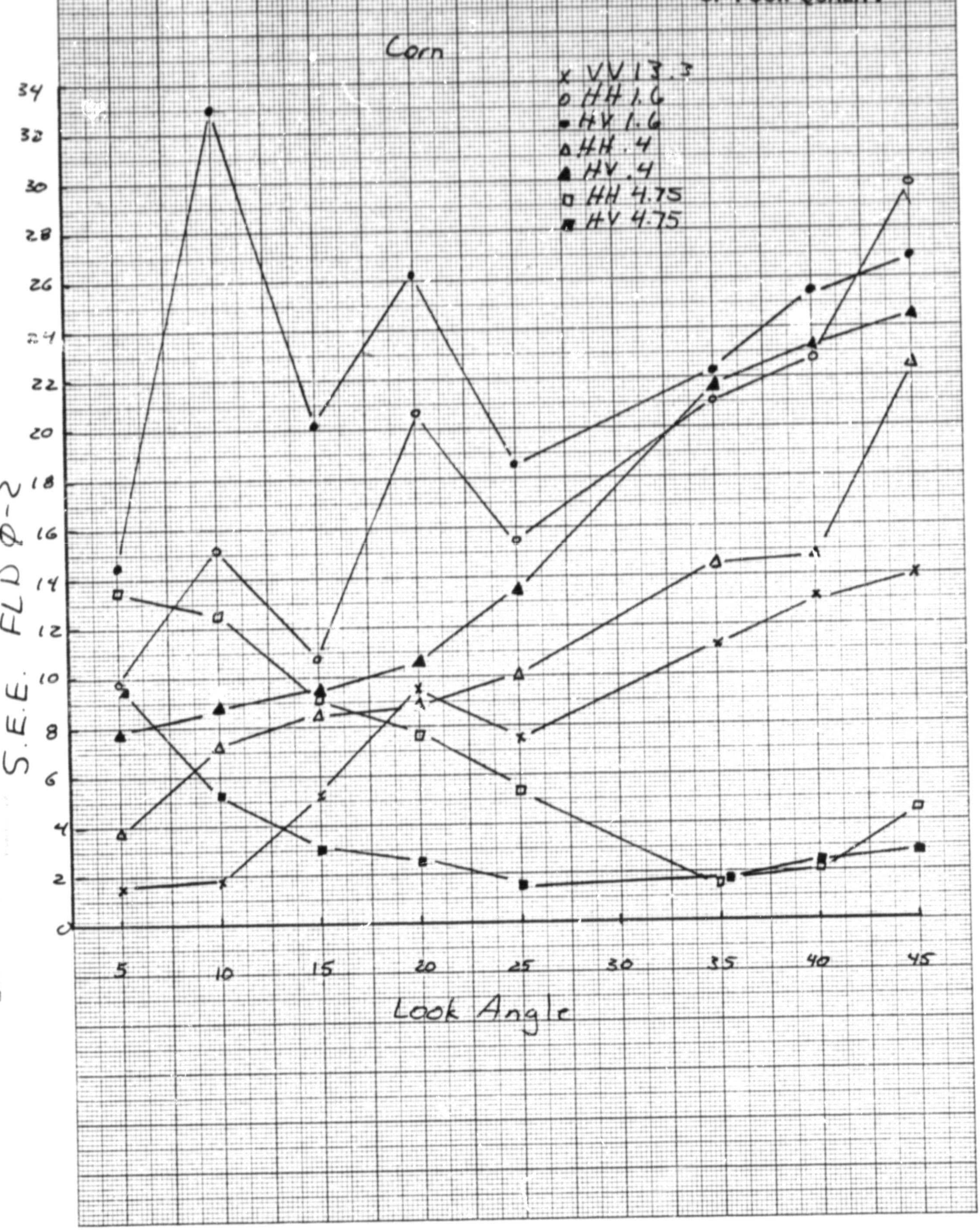
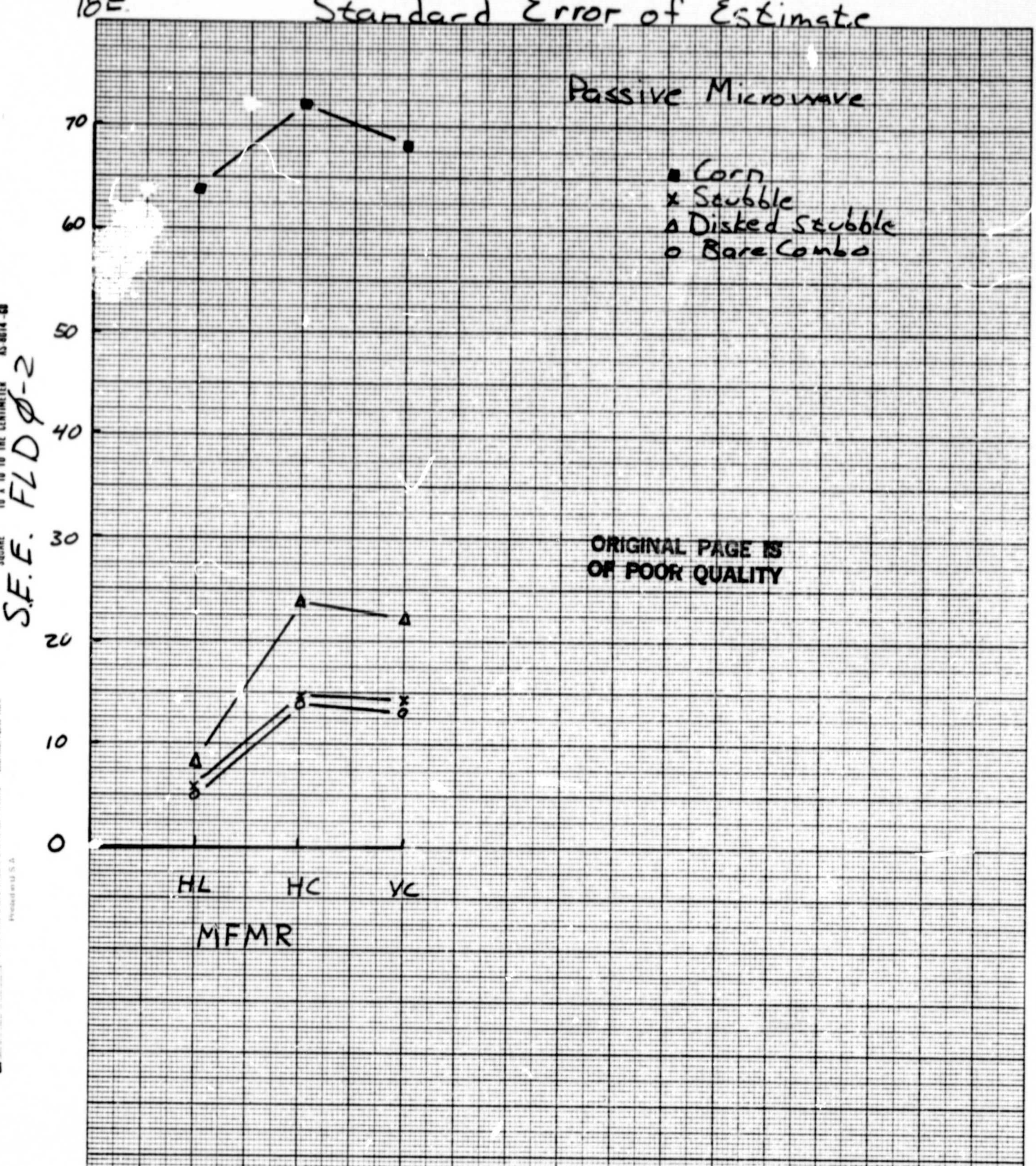


Fig 18E



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C - 2

Single Variable Regression Constants:

Showing Effect of Cover and Look Angle

Fig 19A

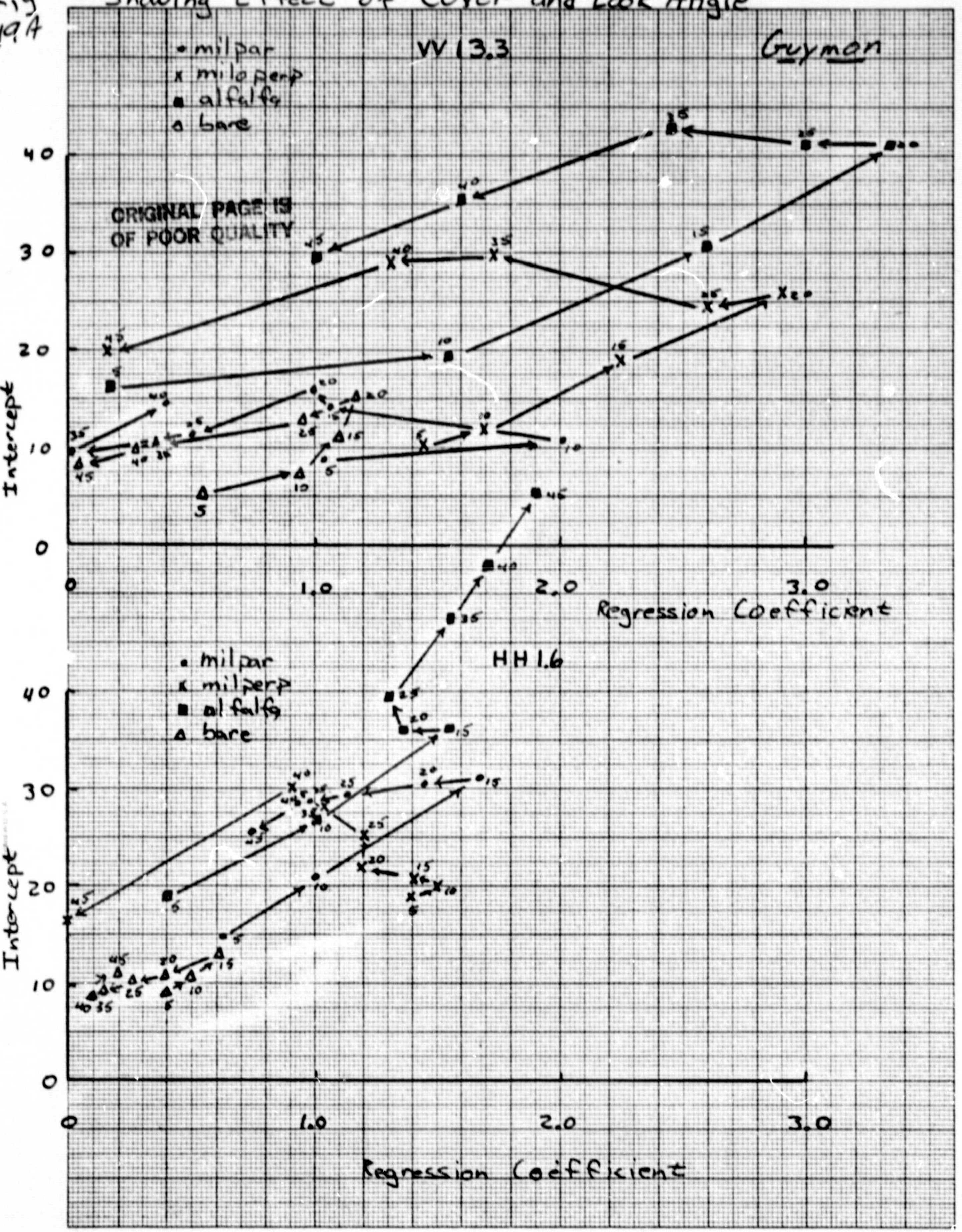
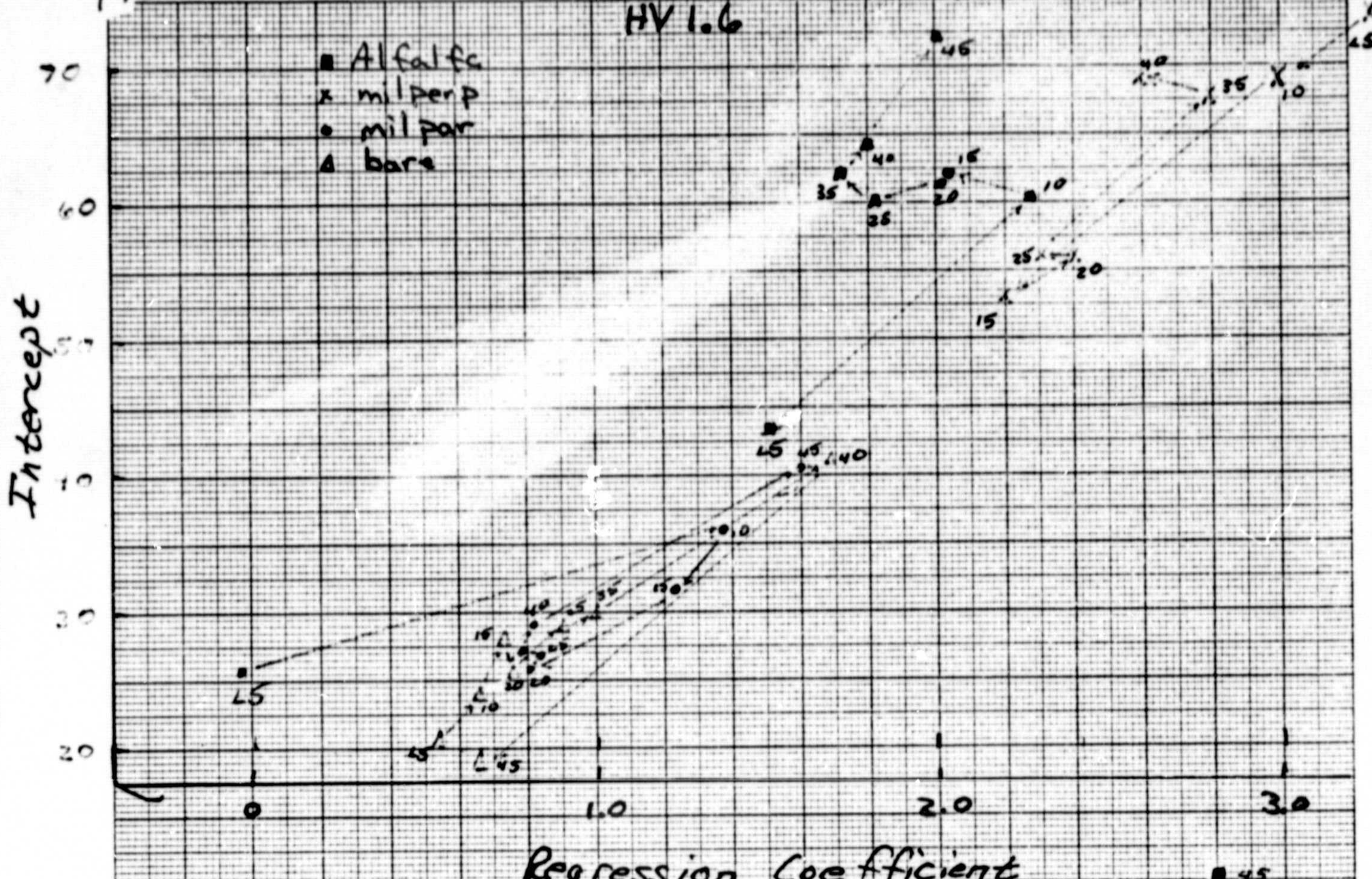


Fig 19B

Guymon



Fig

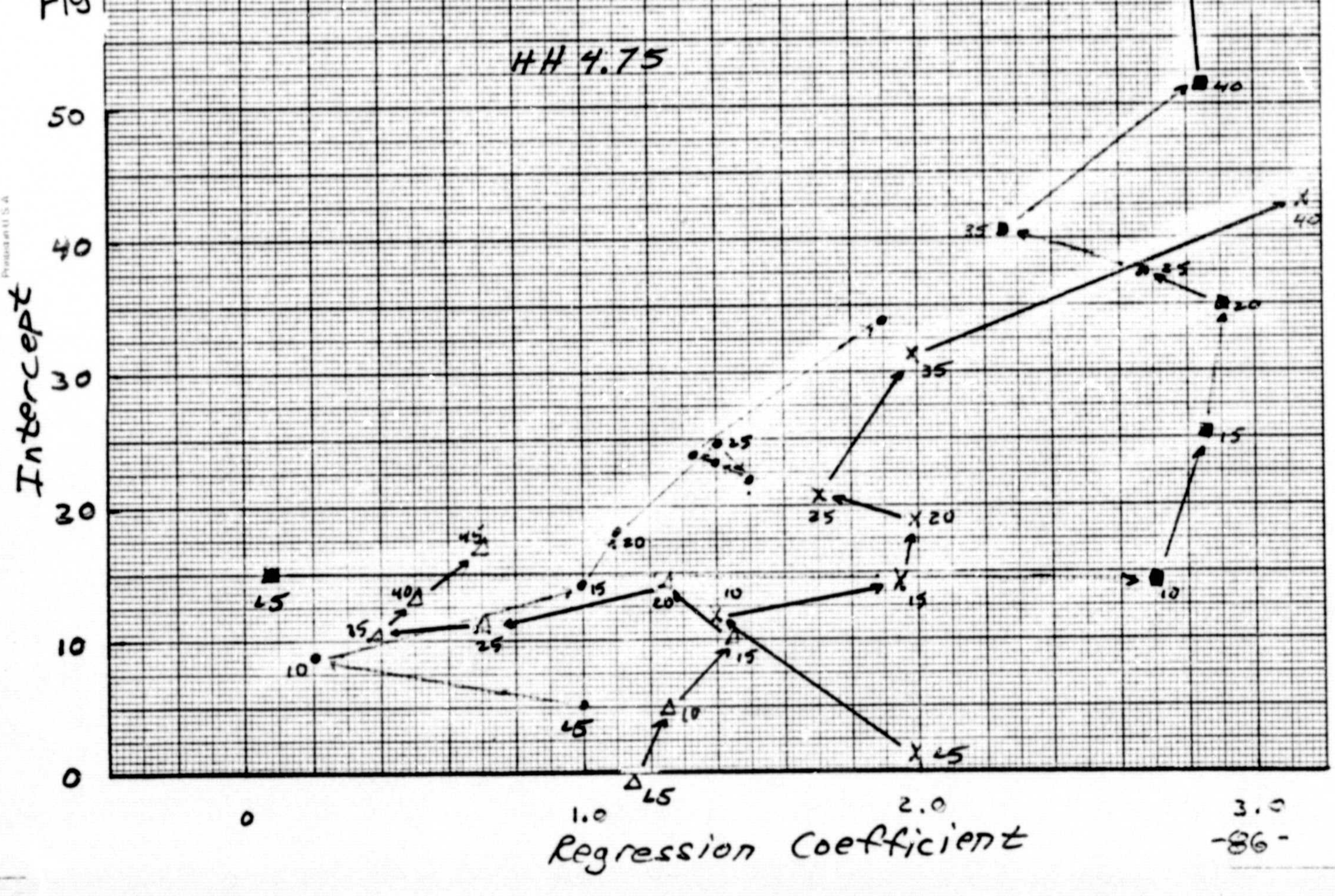


Fig 19C

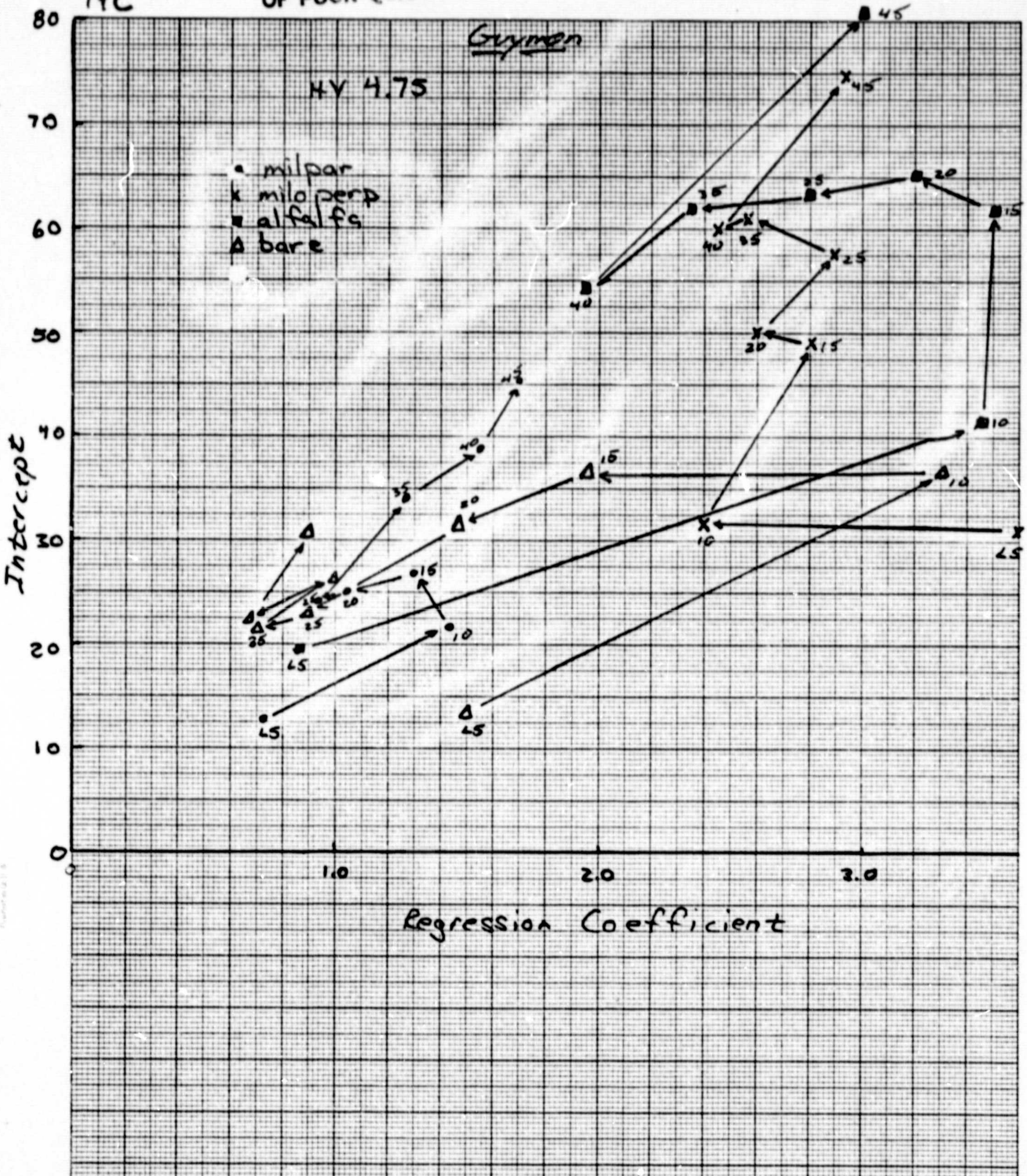

Guymon
HV 4.75
• milpar
x milo perp
■ alfalfa
Δ bare
Intercept
Regression Coefficient
0
10
20
30
40
50
60
70
80
1.0
2.0
3.0

Fig 19 D

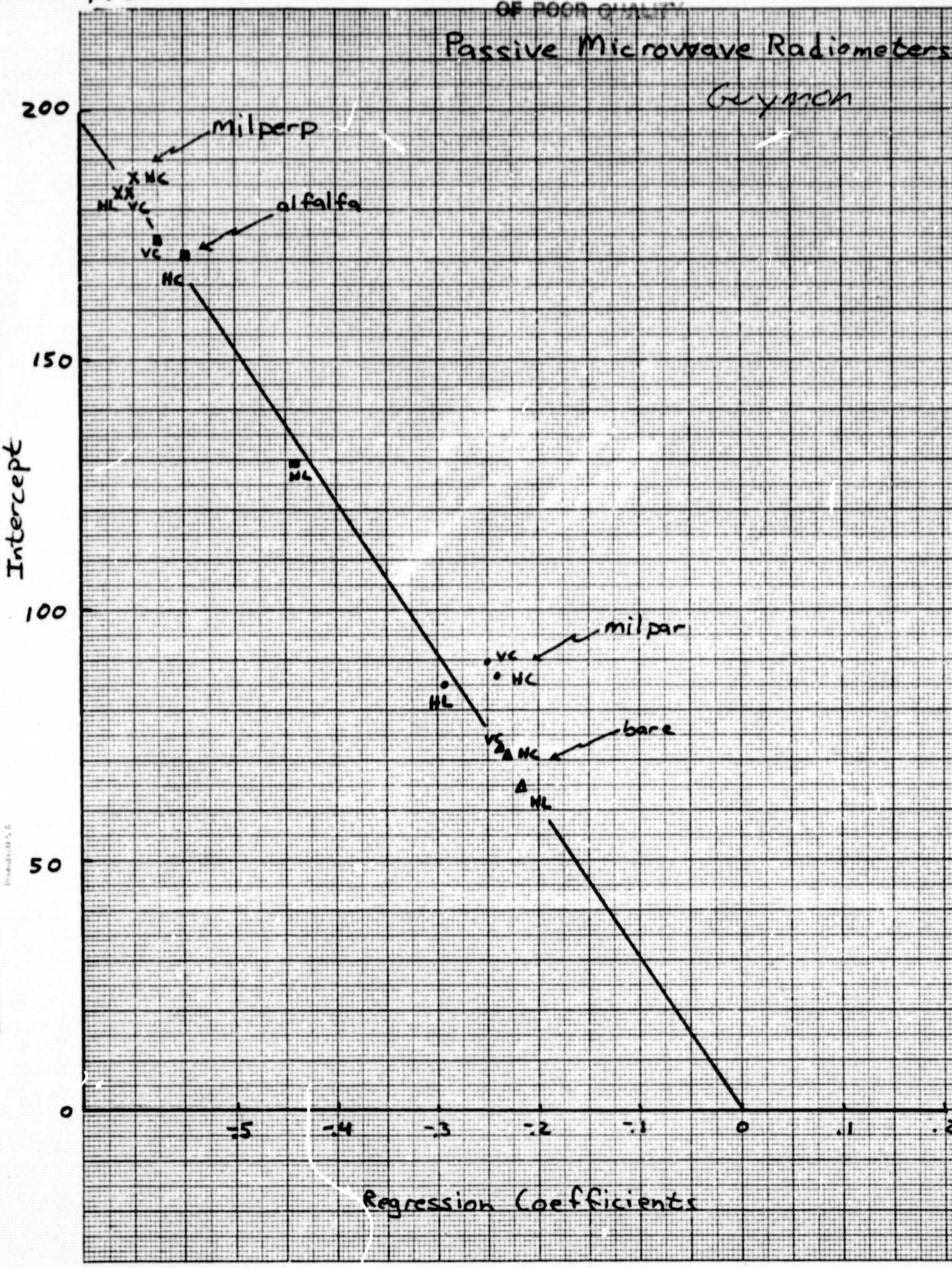

Passive Microwave Radiometers
Guymon
Intercept
200
150
100
50
0
Milperp
HC
HL
VC
alfalfa
VC
HC
HL
milpar
VC
HC
HL
bare
VC
HC
HL
-.5
-.4
-.3
-.2
-.1
0
.1
.2
Regression Coefficients

Fig 20A Single Variable Regression Constants showing Effect of Cover and Look Angle

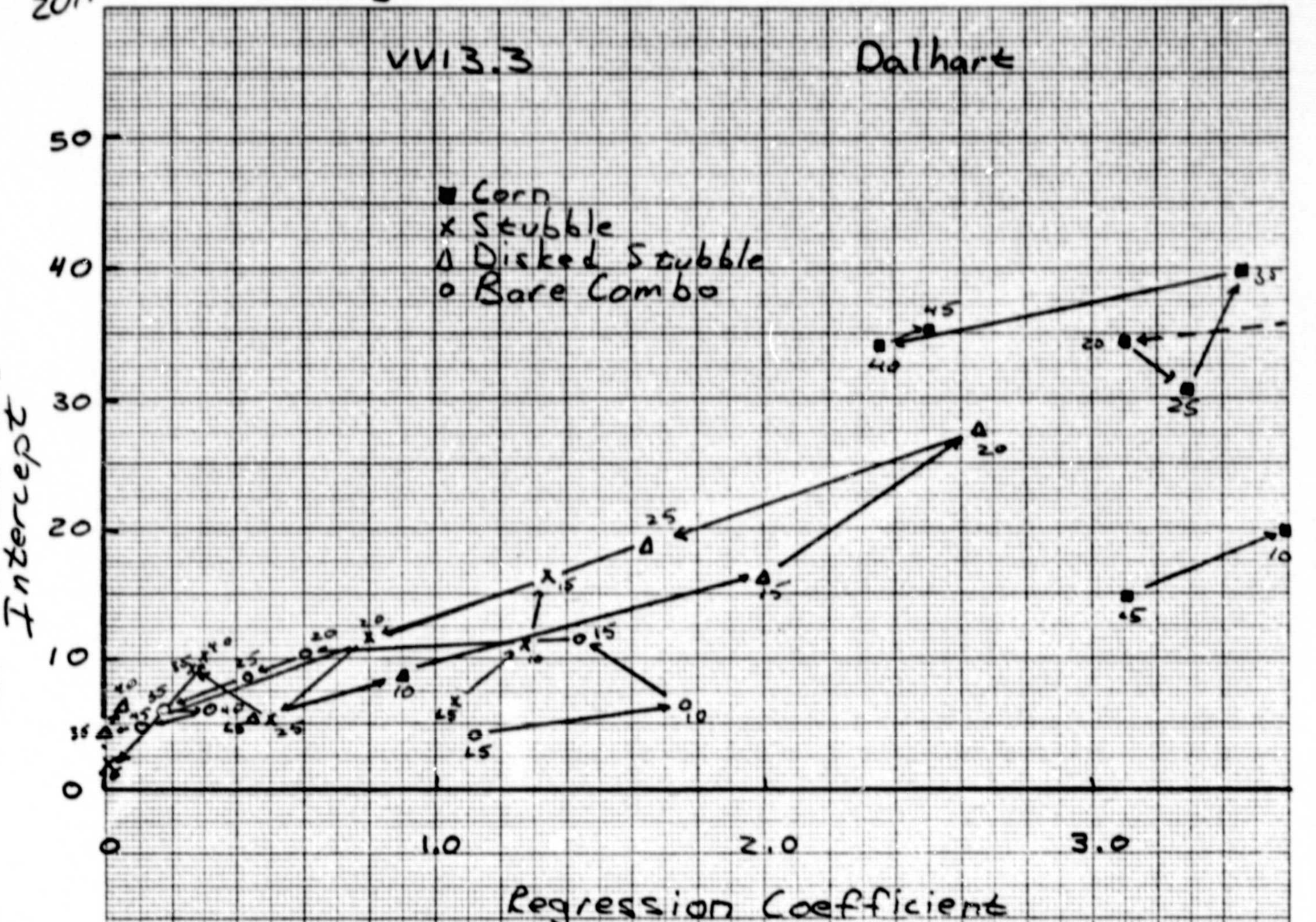


Fig 20B

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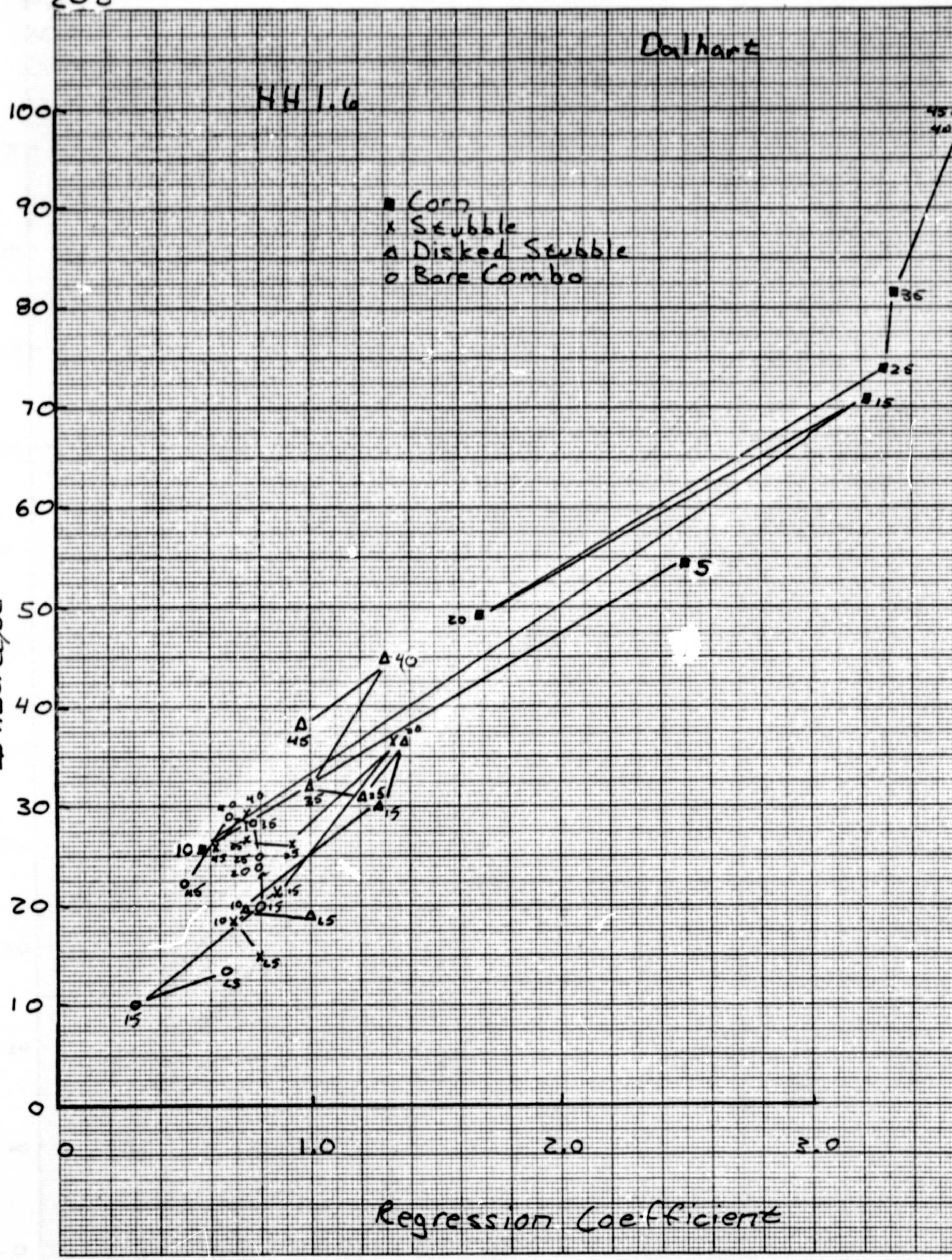

Fig
20c

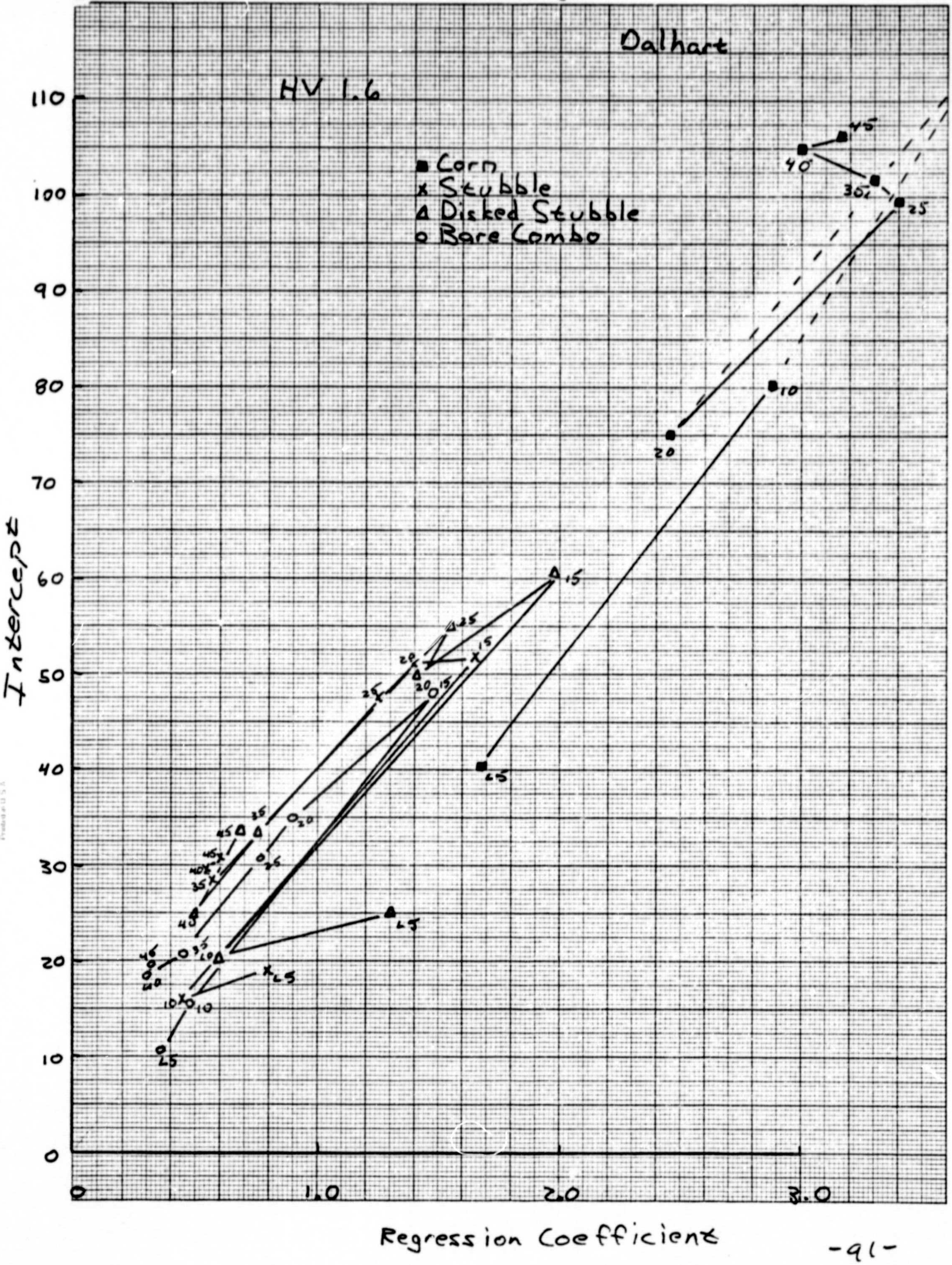
Dalhart
HV 1.6
Corn
Stubble
Disked Stubble
Bare Combo
Intercept
0
10
20
30
40
50
60
70
80
90
100
110
0
1.0
2.0
3.0
Regression Coefficient

Fig 20D

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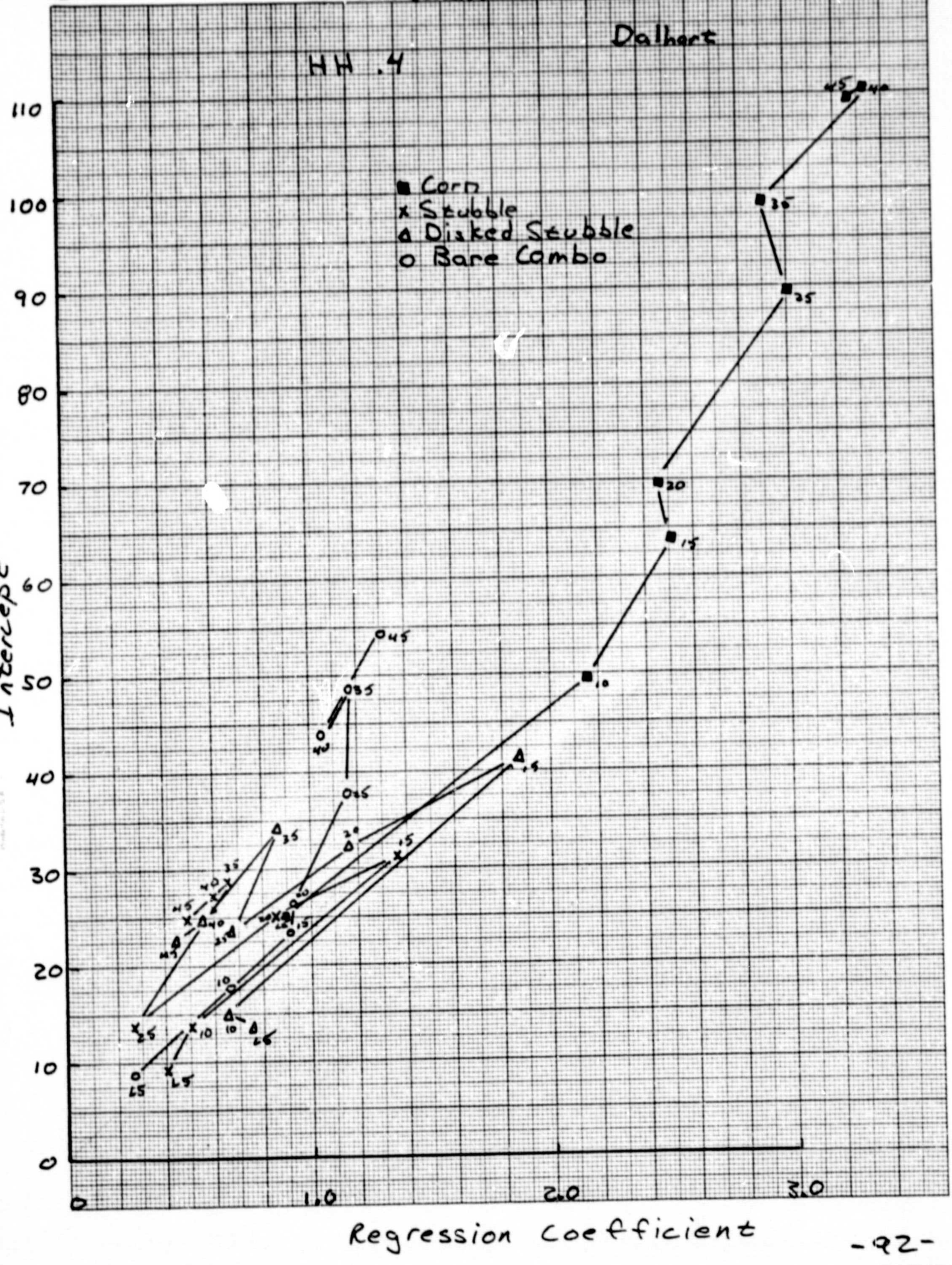


Fig 20 E

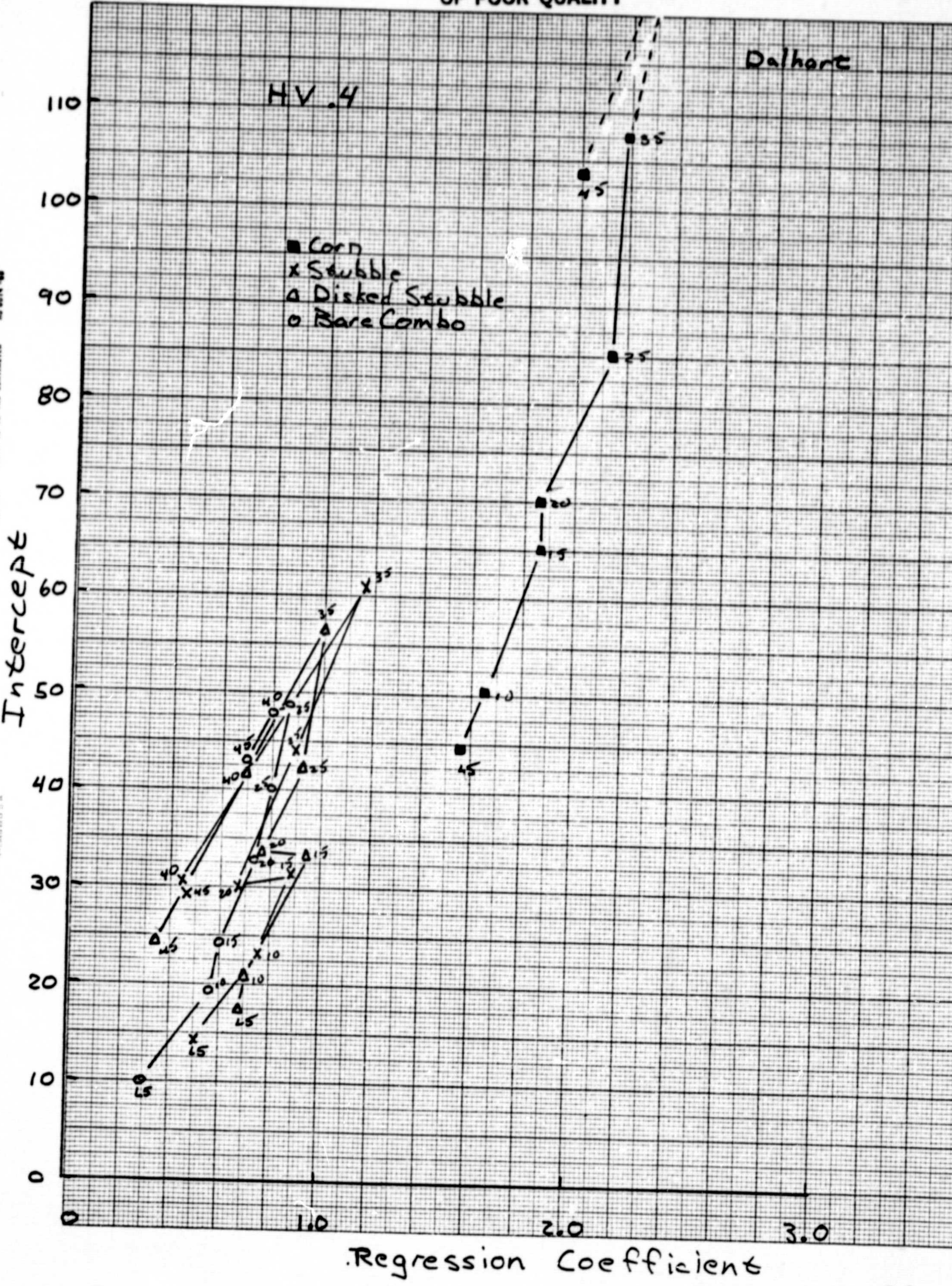

Dalhart
HV .4
■ Corn
x Stubble
△ Disked Stubble
o Bare Combo
Intercept
0
10
20
30
40
50
60
70
80
90
100
110
0
1.0
2.0
3.0
Regression Coefficient

Fig
20 F

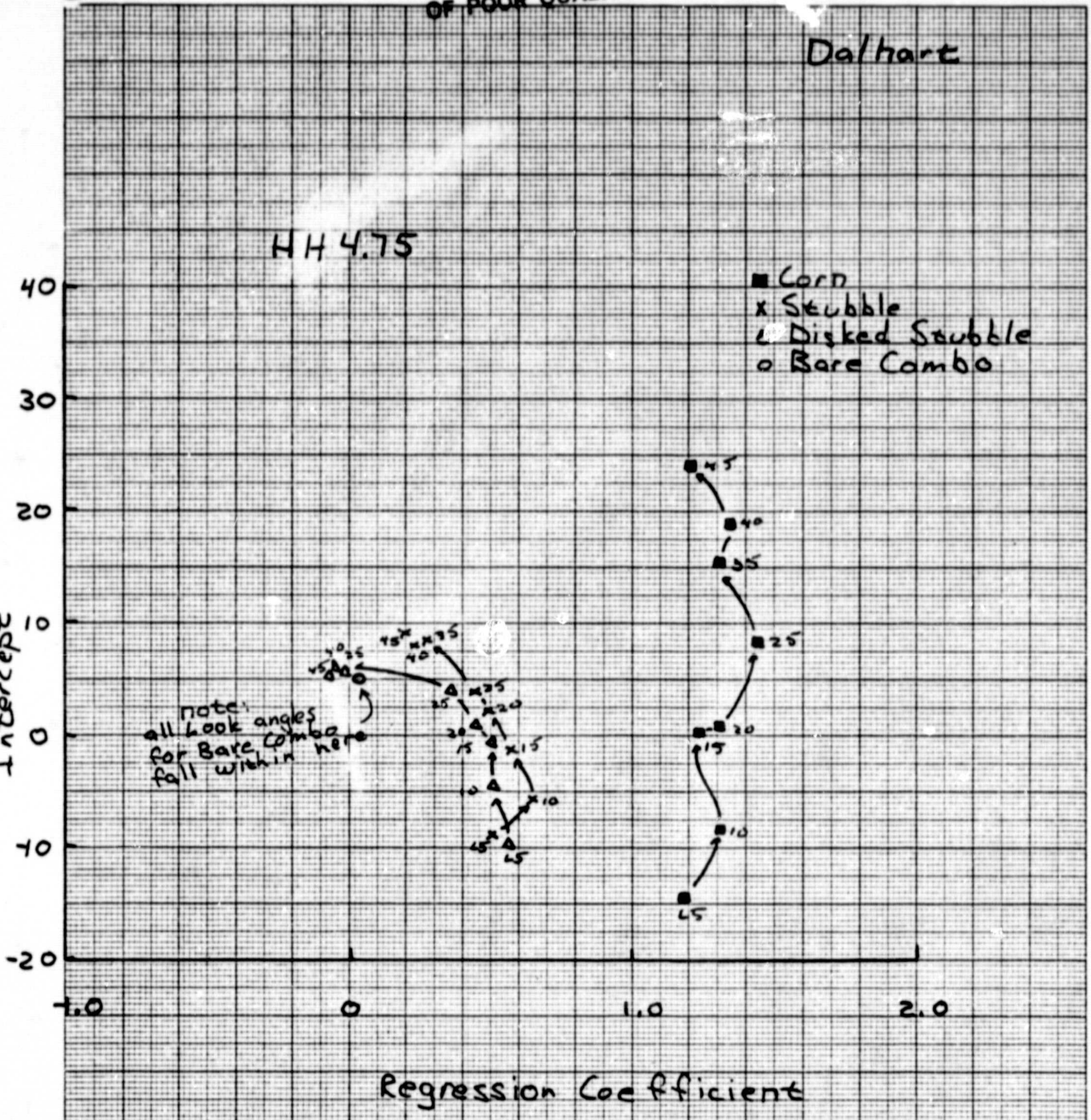

Dalhart
HH 4.75
■ Corn
x Stubble
△ Disked Stubble
o Bare Combo
note: all look angles for Bare Combo fall within here
Intercept
Regression Coefficient
40
30
20
10
0
-10
-20
-1.0
0
1.0
2.0

Fig 20G

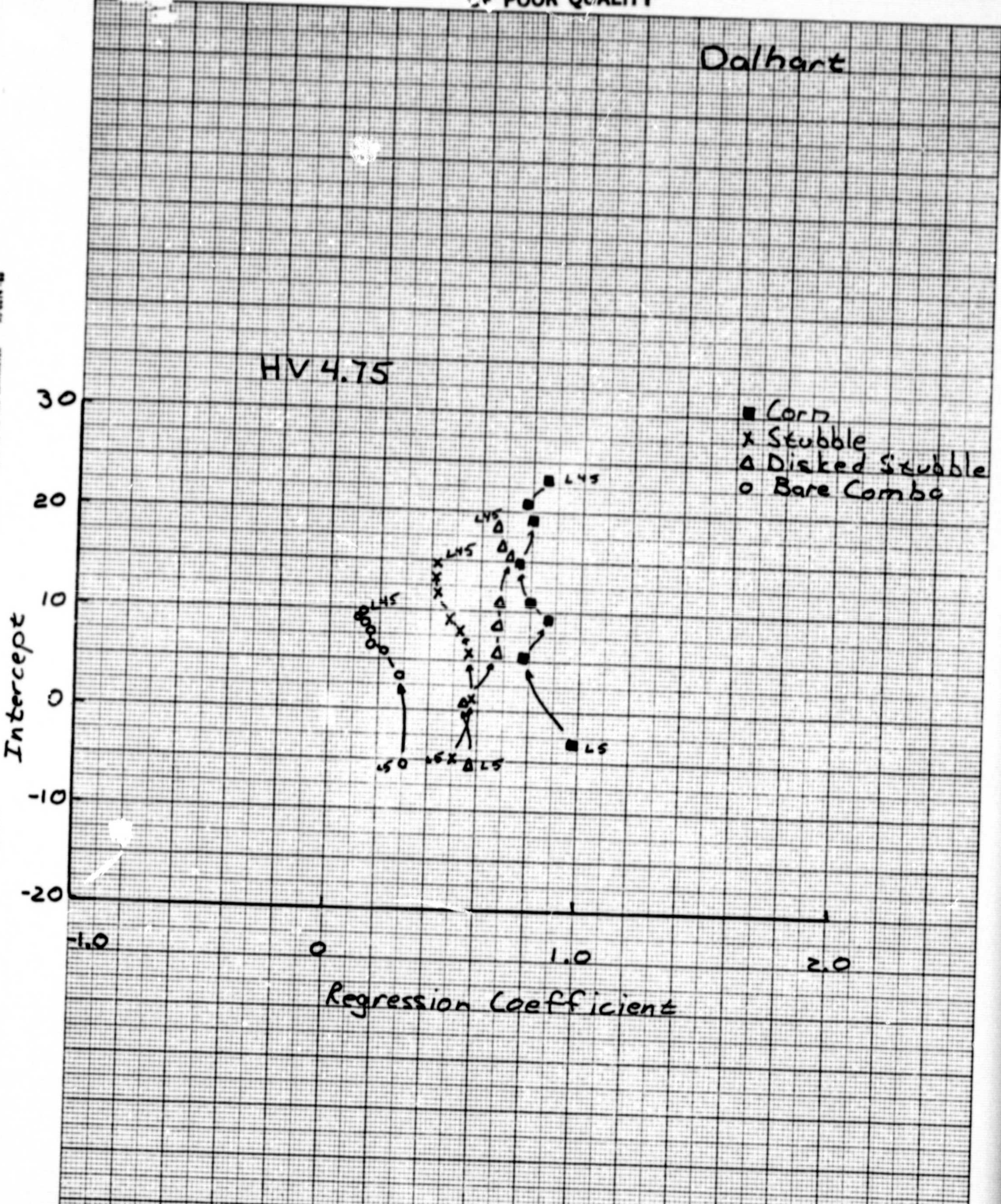
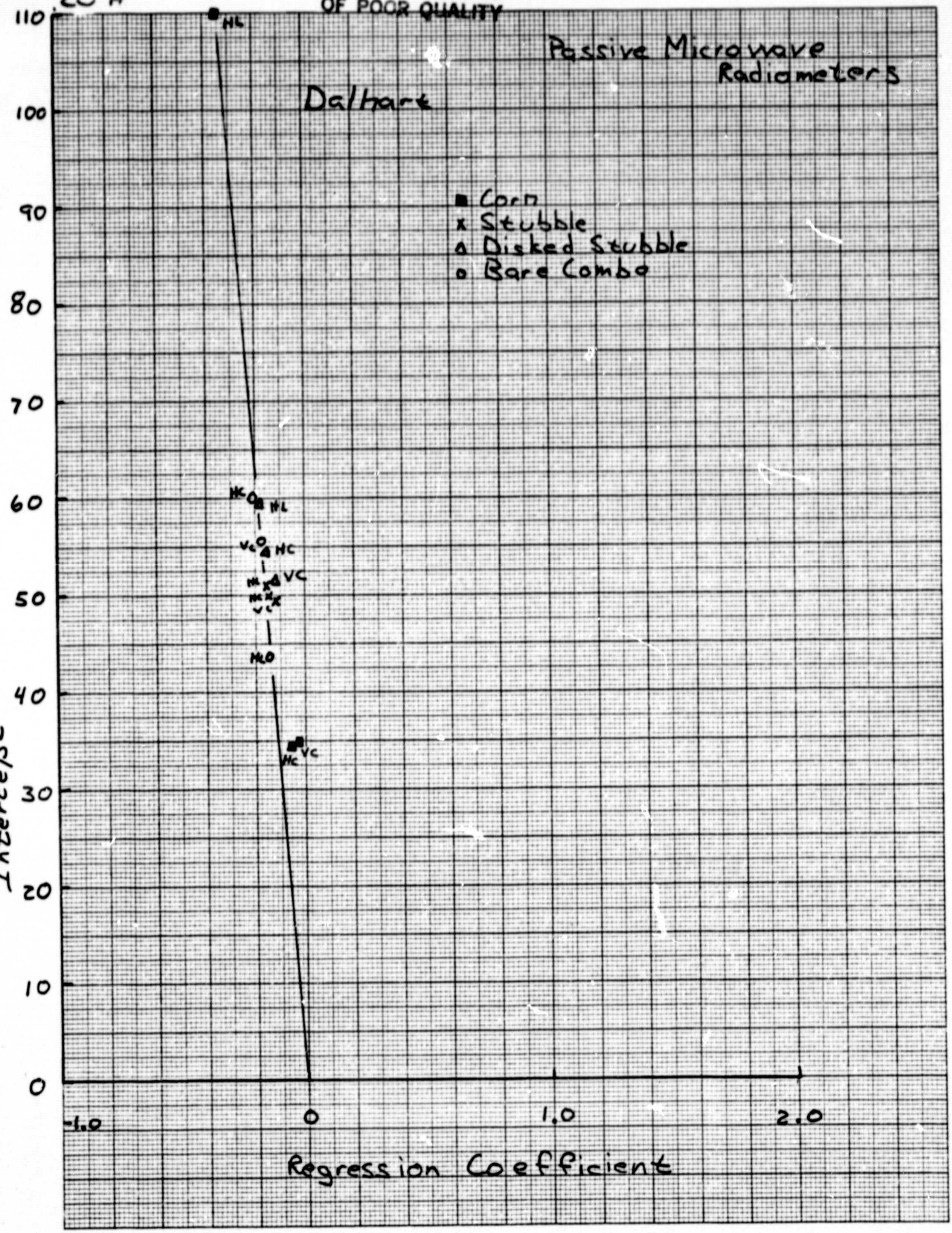

Dalhart
HV 4.75
Corn
Stubble
Disked Stubble
Bare Combo
L45
L5
Intercept
Regression Coefficient
30
20
10
0
-10
-20
-1.0
0
1.0
2.0

Fig 20 H


Passive Microwave Radiometers
Dalhart
■ Corn
x Stubble
Δ Disked Stubble
o Bare Combo
Intercept
Regression Coefficient
110
100
90
80
70
60
50
40
30
20
10
0
-1.0
0
1.0
2.0
HL
HC
HL
VC
HC
VC
HC
HC
VC
HC
HC
VC

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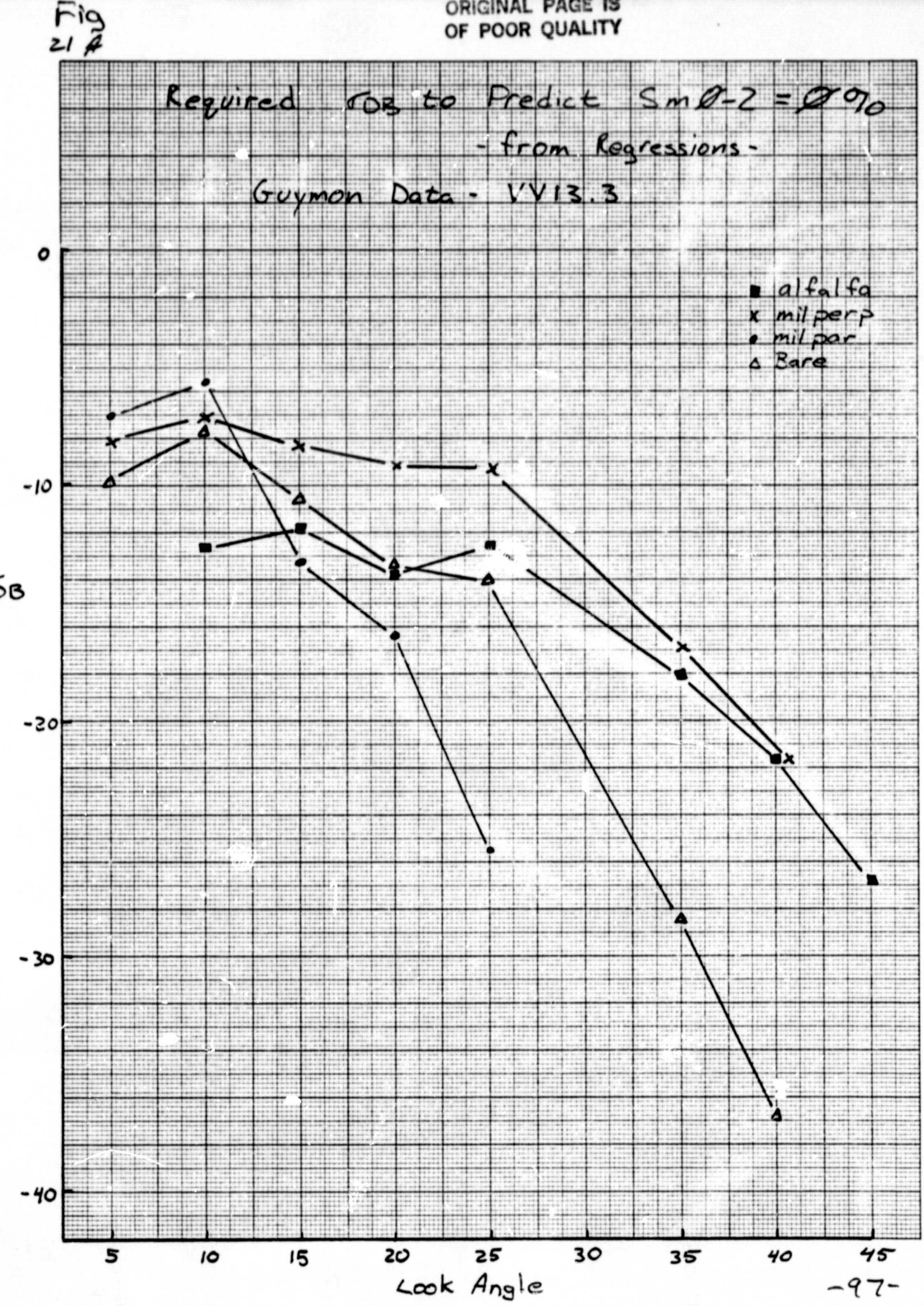

Fig 21 B

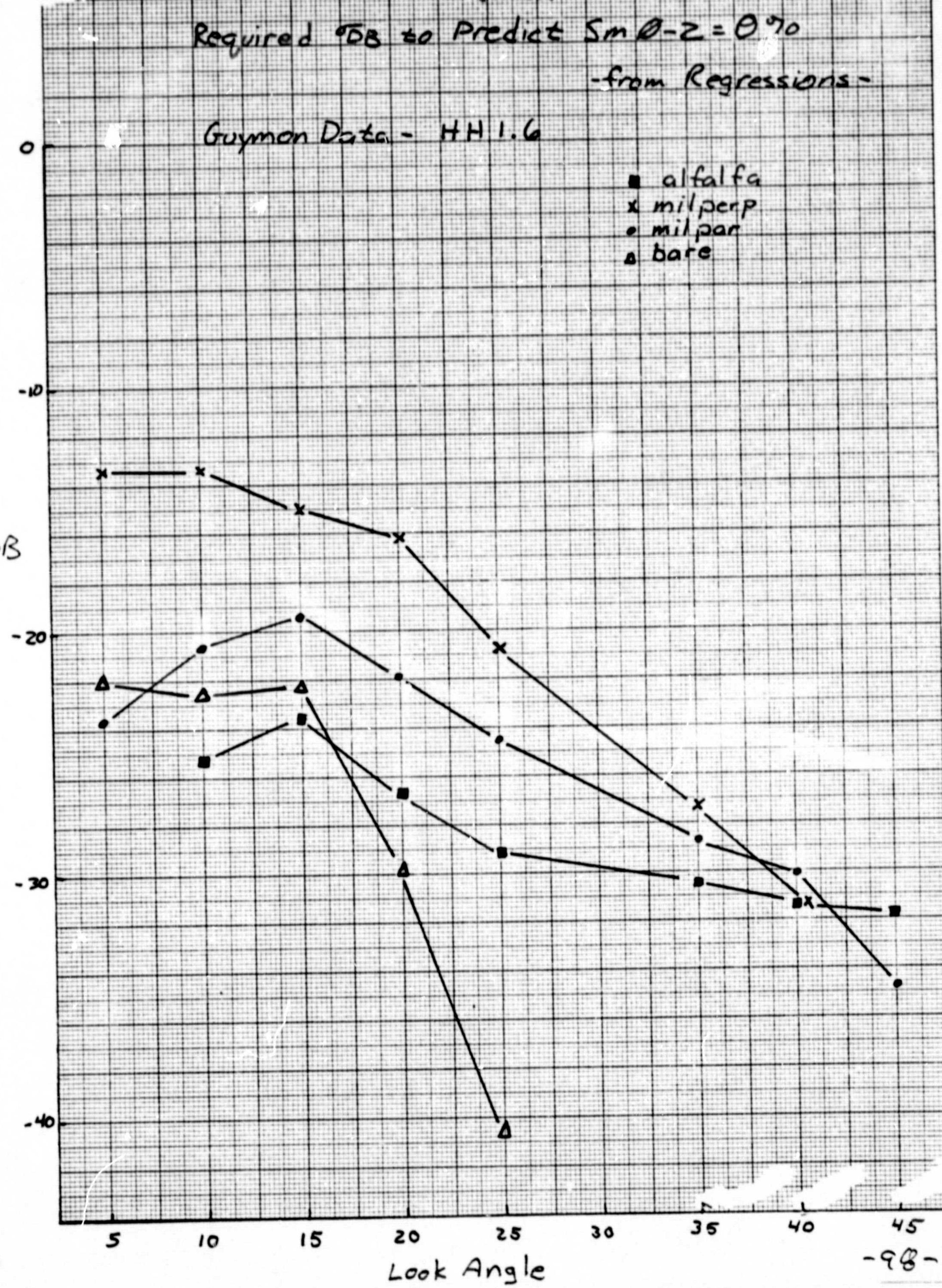
Required σDB to Predict Sm θ-Z = 0 %
-from Regressions-
Guymon Data - HH 1.6
alfalfa
milperp
milpar
bare
0
-10
-20
-30
-40
σDB
5
10
15
20
25
30
35
40
45
Look Angle

Fig 21C

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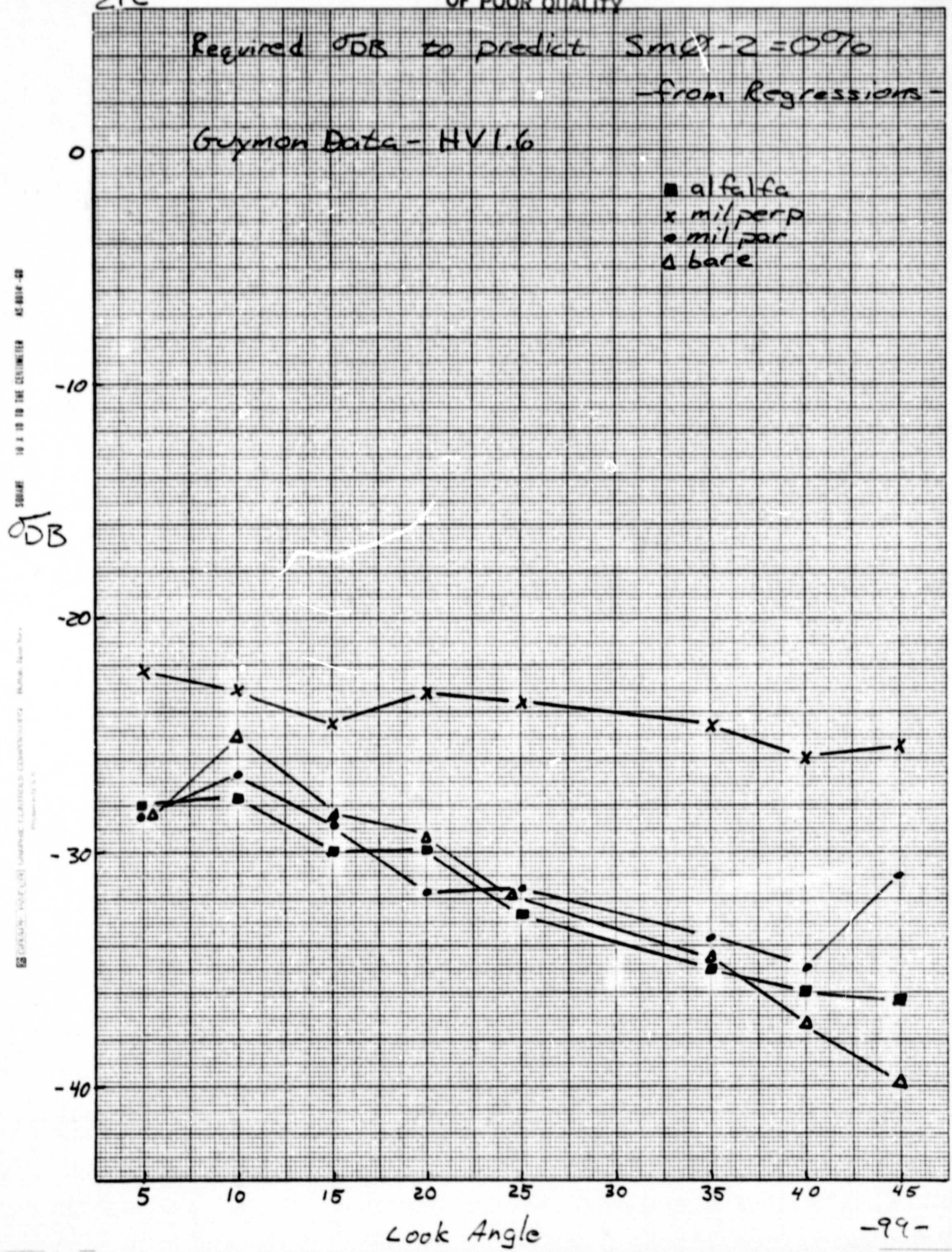


Fig 21D

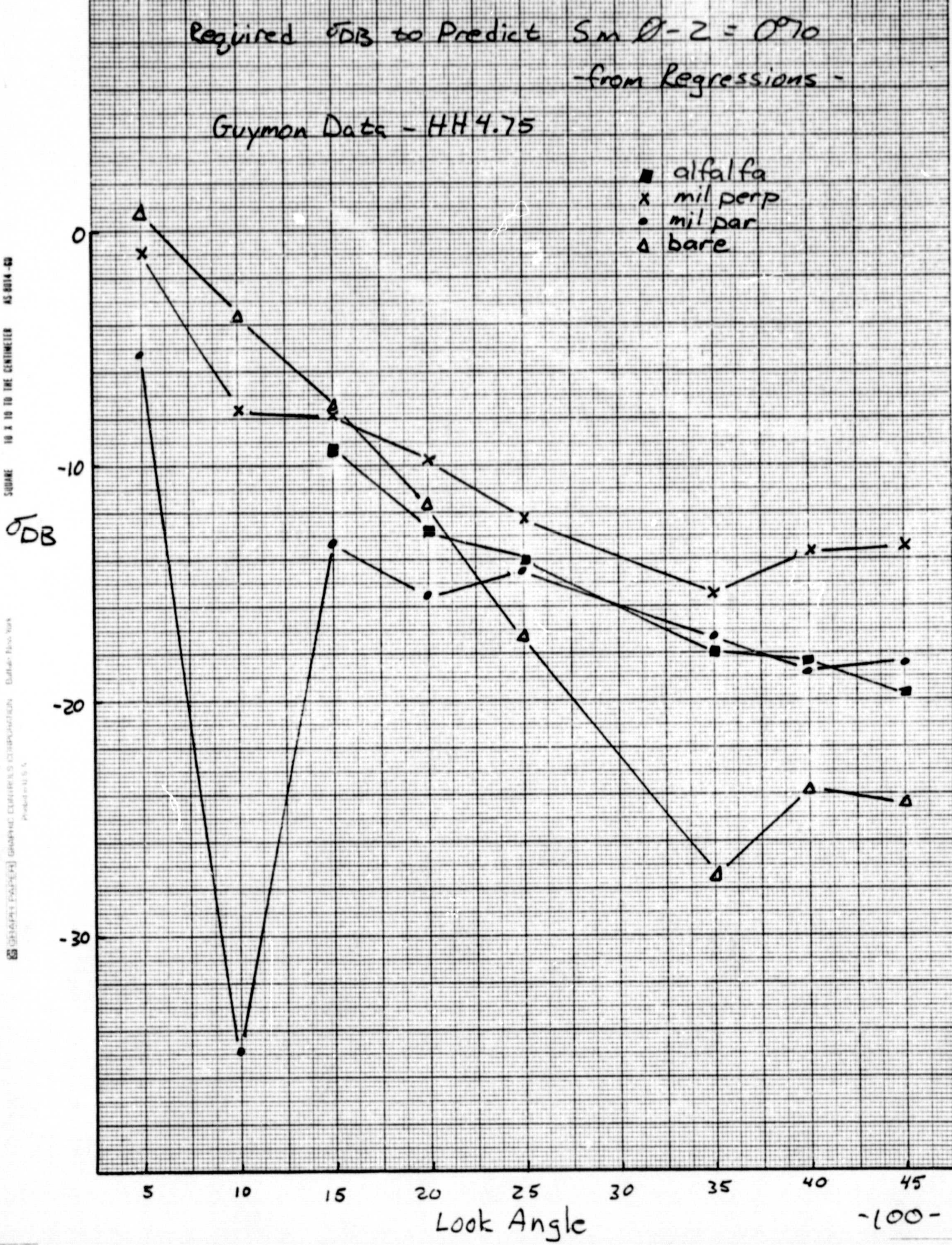

Required σDB to Predict Sm Ø-2 = 0%
-from Regressions -
Guymon Data - HH 4.75
alfalfa
mil perp
mil par
bare
0
-10
-20
-30
σDB
5
10
15
20
25
30
35
40
45
Look Angle

Fig 21E

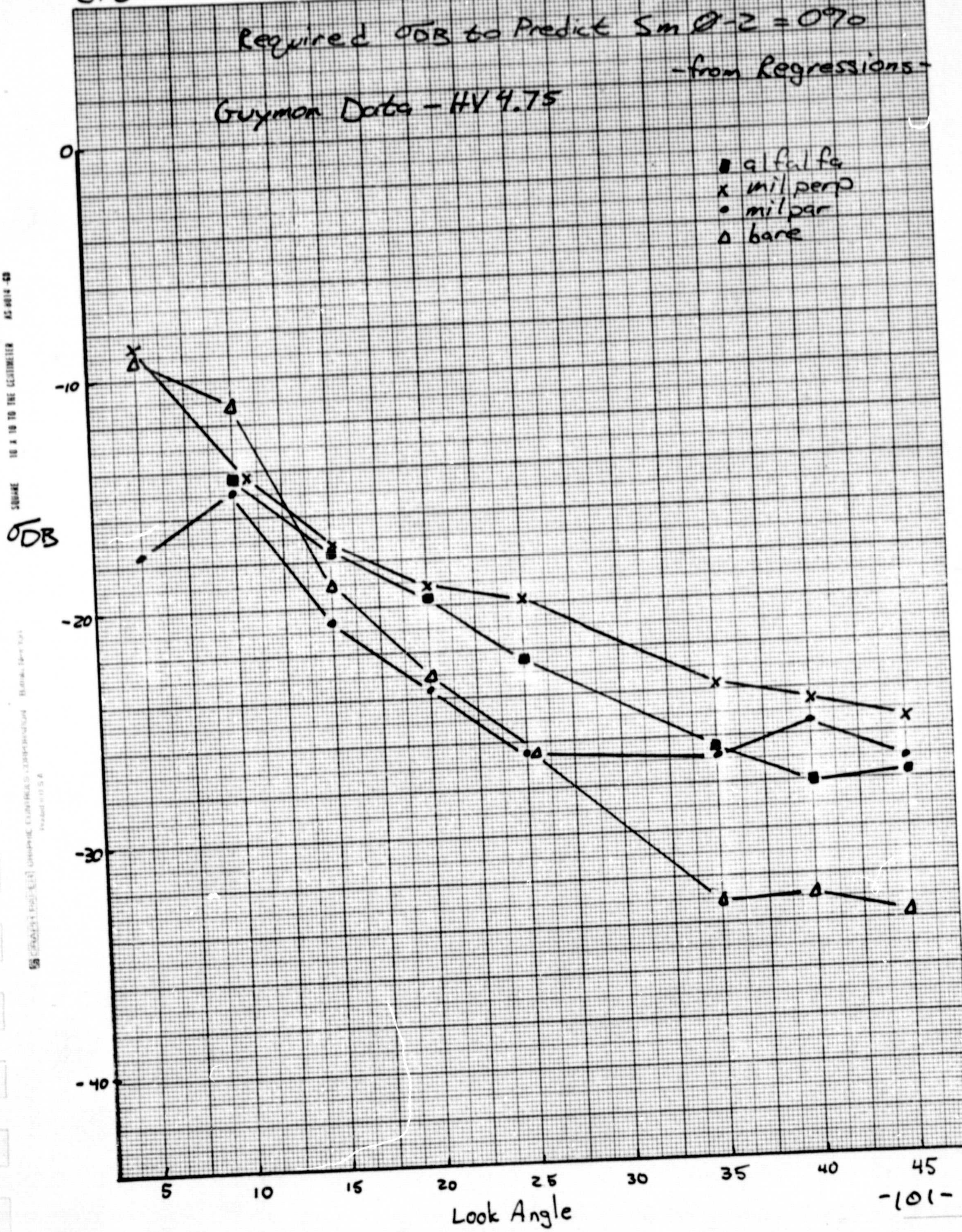

Required σDB to Predict Sm 0-2 = 0%
-from Regressions-
Guymon Data - HV 4.75
alfalfa
mil perp
mil par
bare
0
-10
-20
-30
-40
σDB
5
10
15
20
25
30
35
40
45
Look Angle

Fig 22A

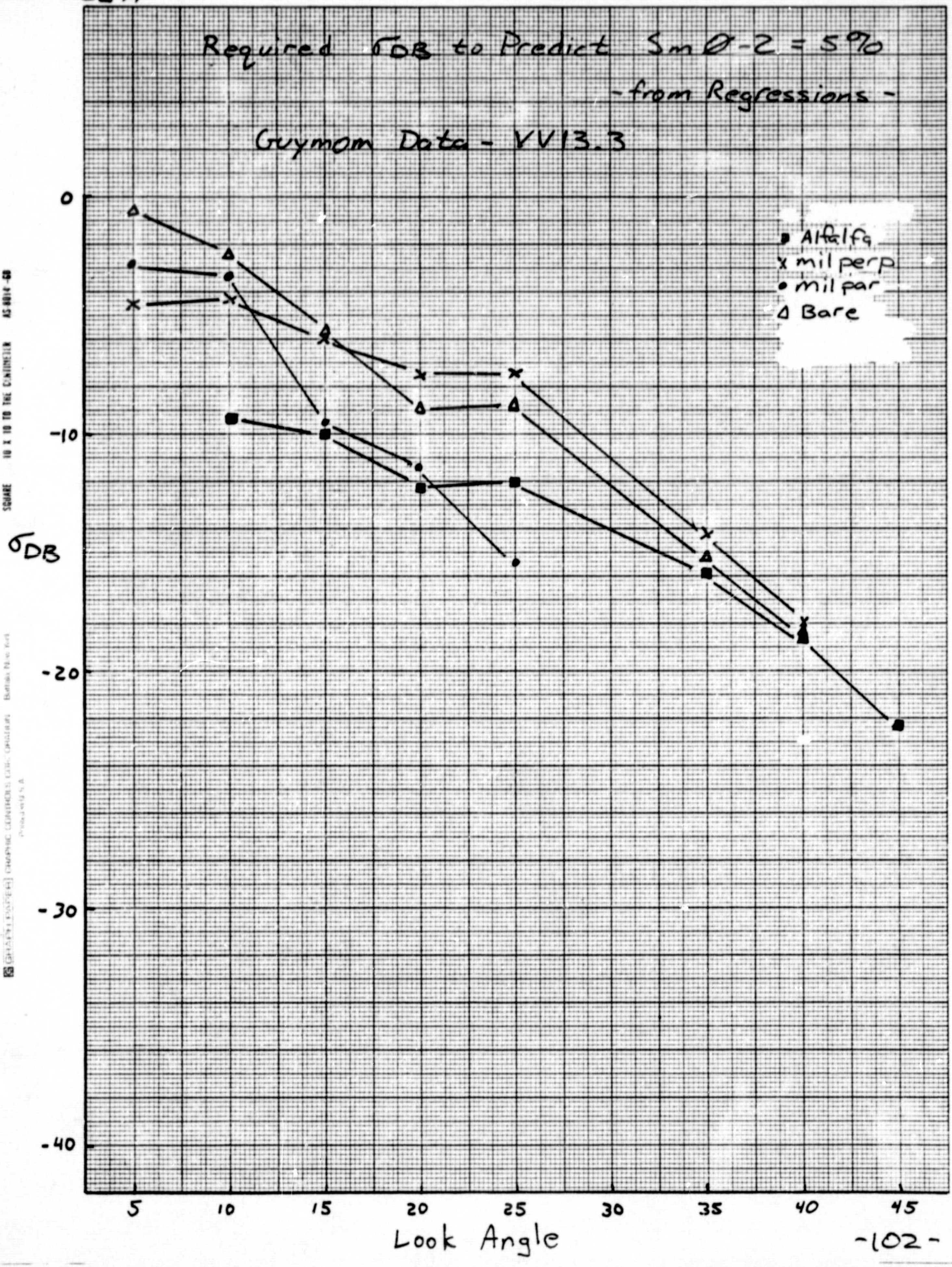

Required σDB to Predict Sm Ø-2 = 5%
- from Regressions -
Guymom Data - VV13.3
0
-10
-20
-30
-40
σDB
Alfalfa
x mil perp
• mil par
Δ Bare
5
10
15
20
25
30
35
40
45
Look Angle

Fig 22B

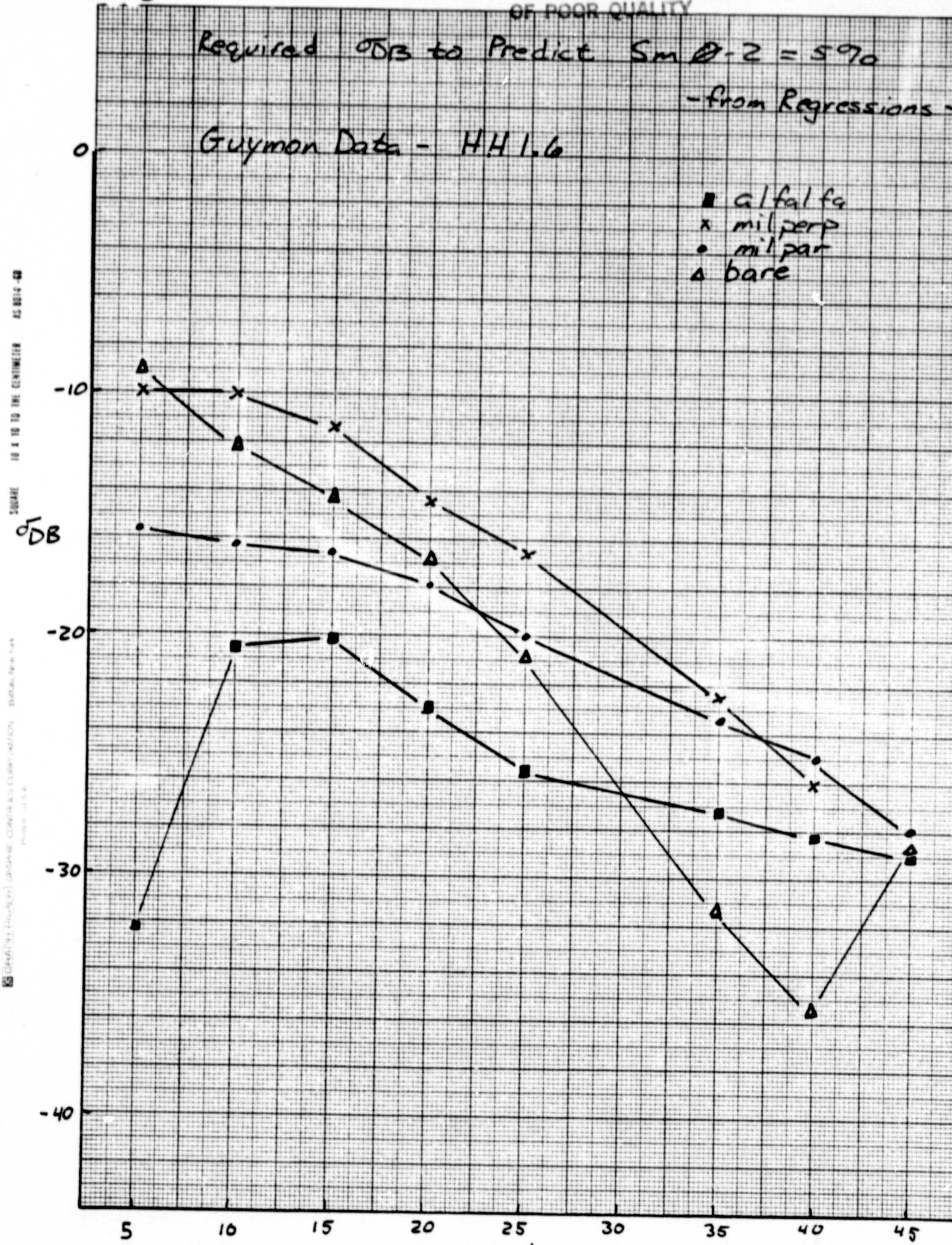
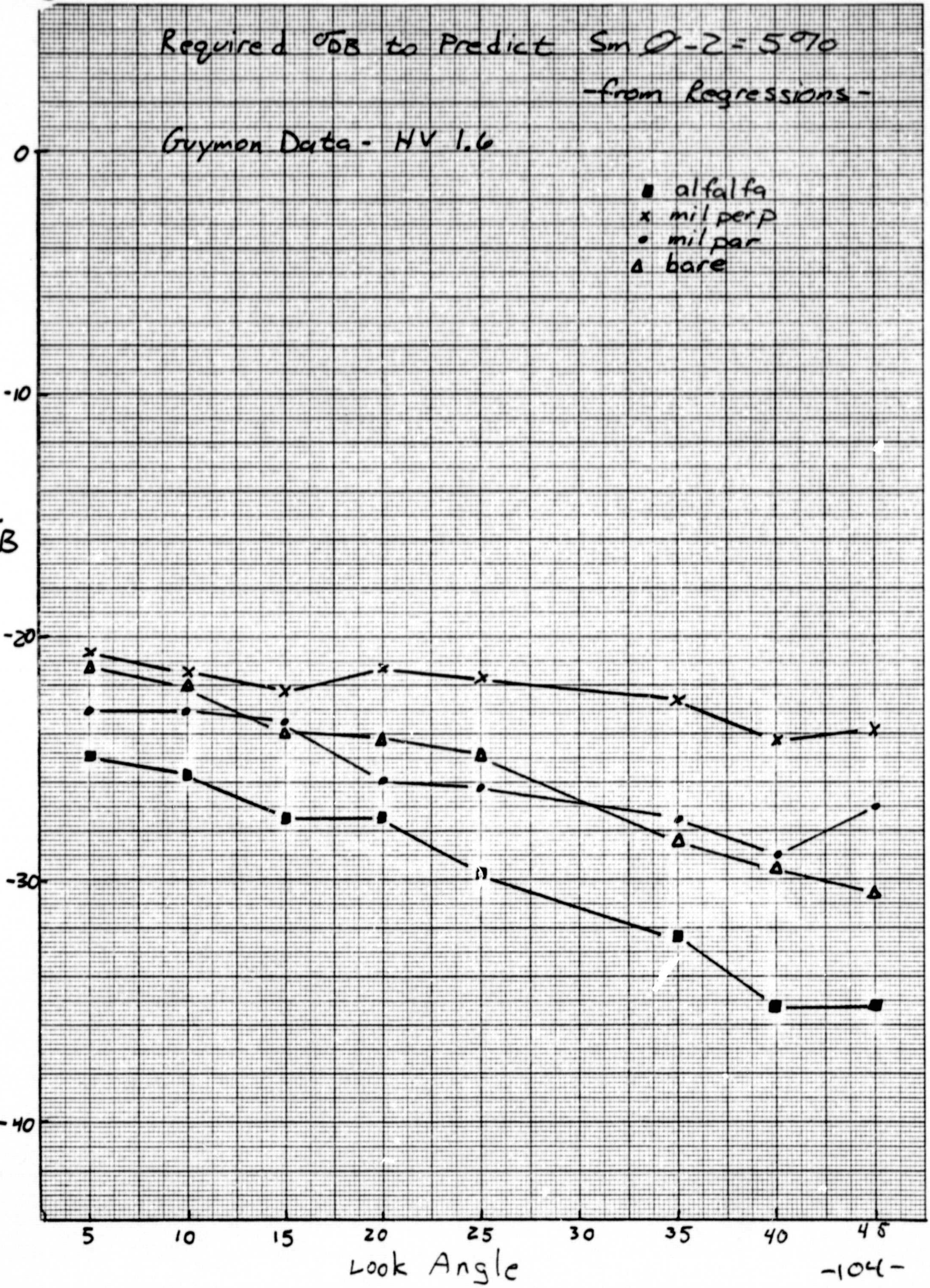

Required σDB to Predict Sm Θ-2 = 5%
-from Regressions-
Guymon Data - HH 1.6
alfalfa
milperp
milpar
bare
0
-10
-20
-30
-40
σDB
5
10
15
20
25
30
35
40
45
Look Angle

Fig
22c



Required σ_{DB} to Predict Sm 0-2 = 5%
-from Regressions-
Guymon Data - HV 1.6
alfalfa
mil perp
mil par
bare
0
-10
-20
-30
-40
σ_{DB}
5
10
15
20
25
30
35
40
45
Look Angle

Fig 22D

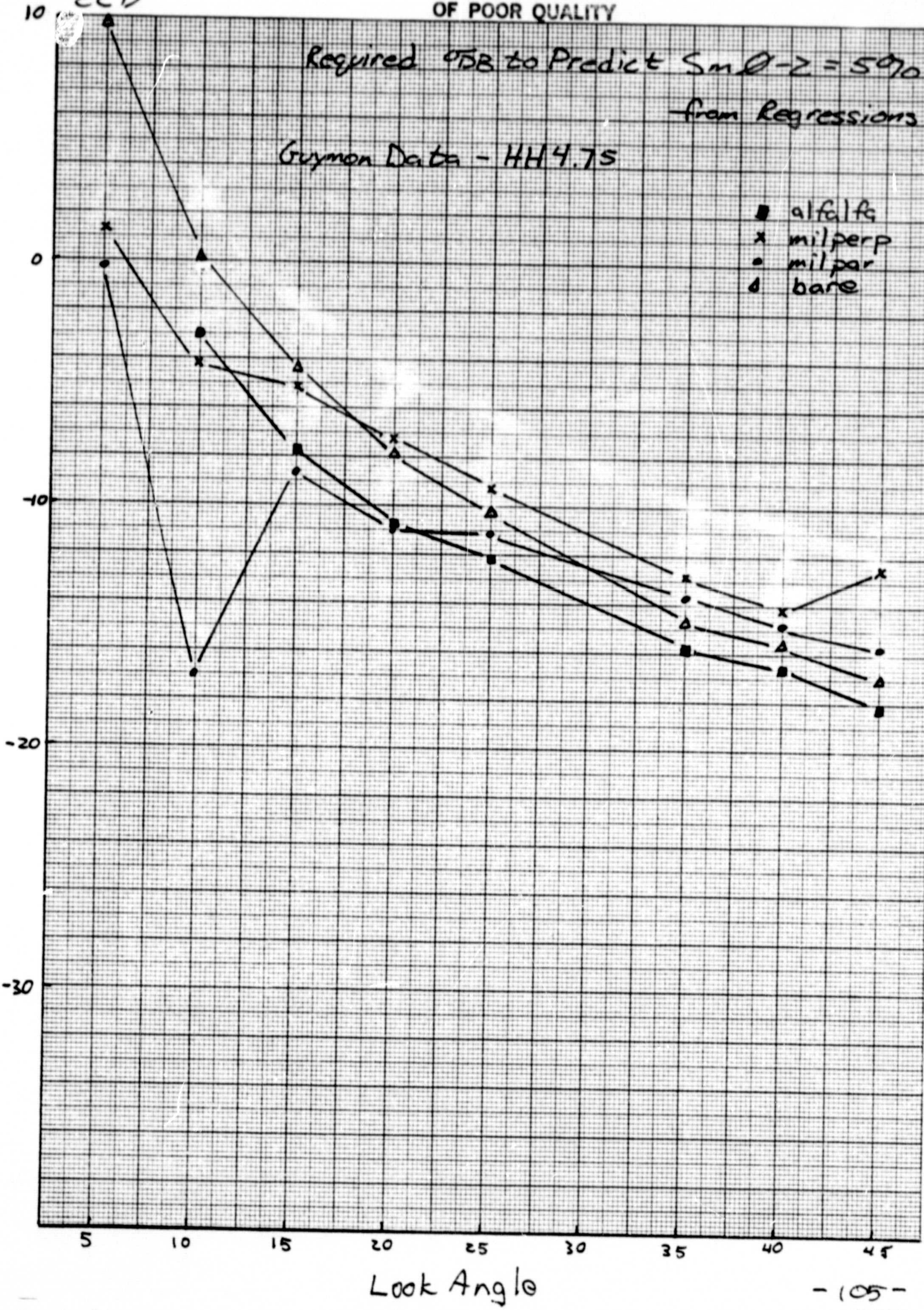
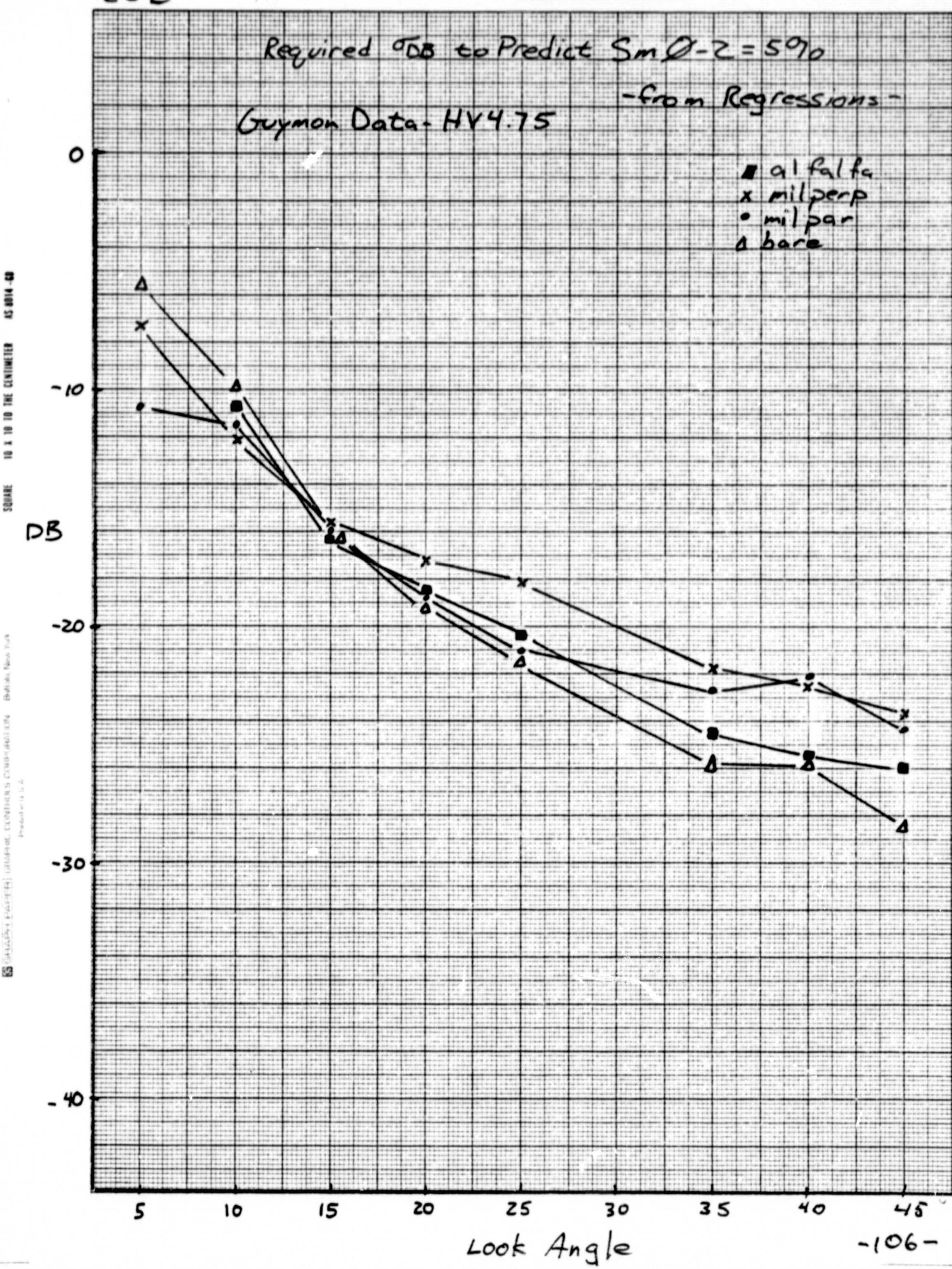

Required σDB to Predict Sm θ-2 = 5%
-from Regressions-
Guymon Data - HH 4.75
alfalfa
milperp
milpar
bare
10
0
-10
-20
-30
5
10
15
20
25
30
35
40
45
Look Angle

Fig
22 E


Required σDB to Predict Sm Ø-Z = 5%
-from Regressions-
Guymon Data - HV 4.75
■ alfalfa
x milperp
• milpar
Δ bare
0
-10
-20
-30
-40
DB
5
10
15
20
25
30
35
40
45
Look Angle
SQUARE 10 X 10 TO THE CENTIMETER 46 0814-40
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Printed in U.S.A.

Fig 23 A

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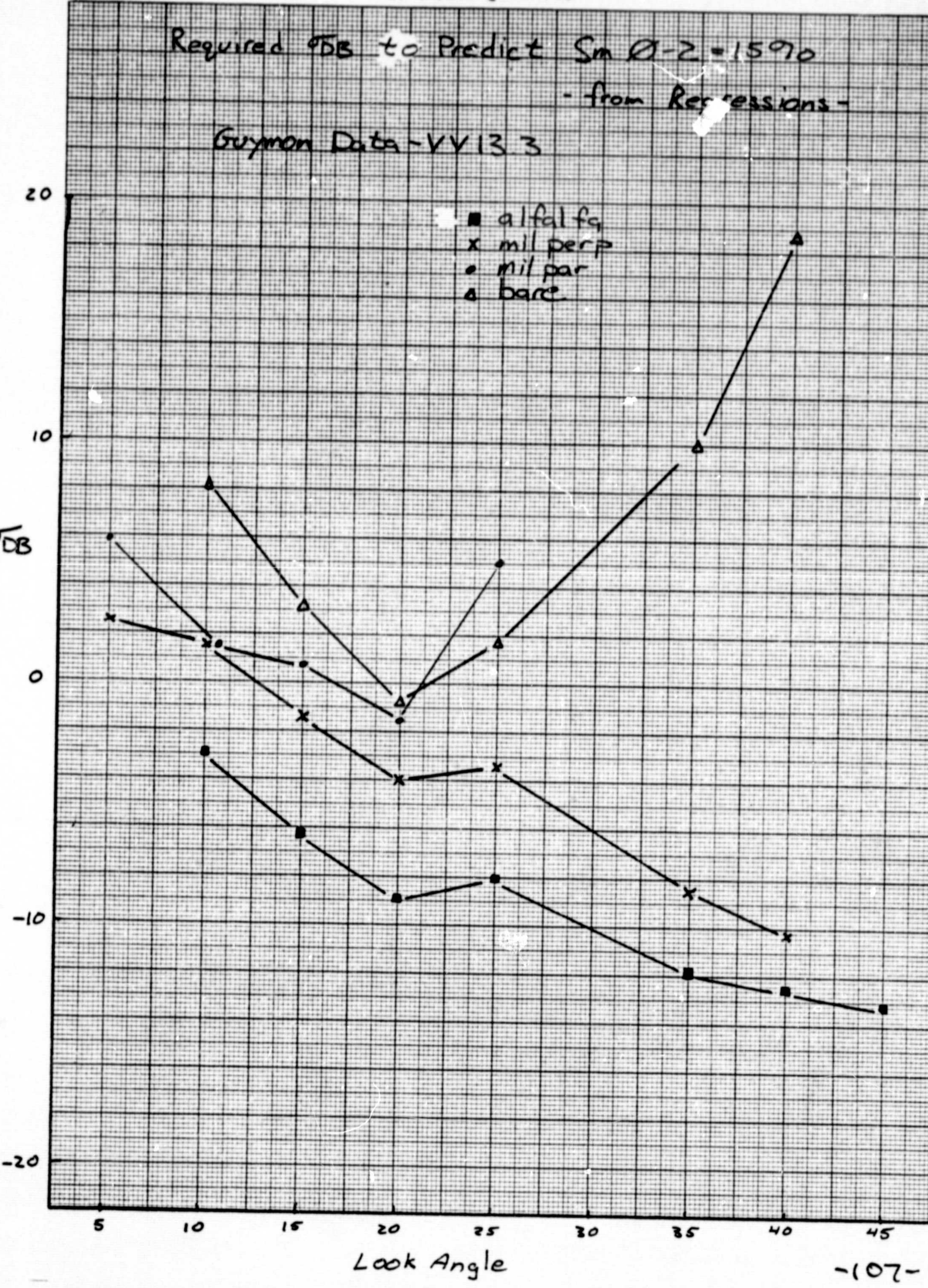


Fig 23B Required σ_{DB} to Predict SmØ-2 = 15%
-from Regressions-

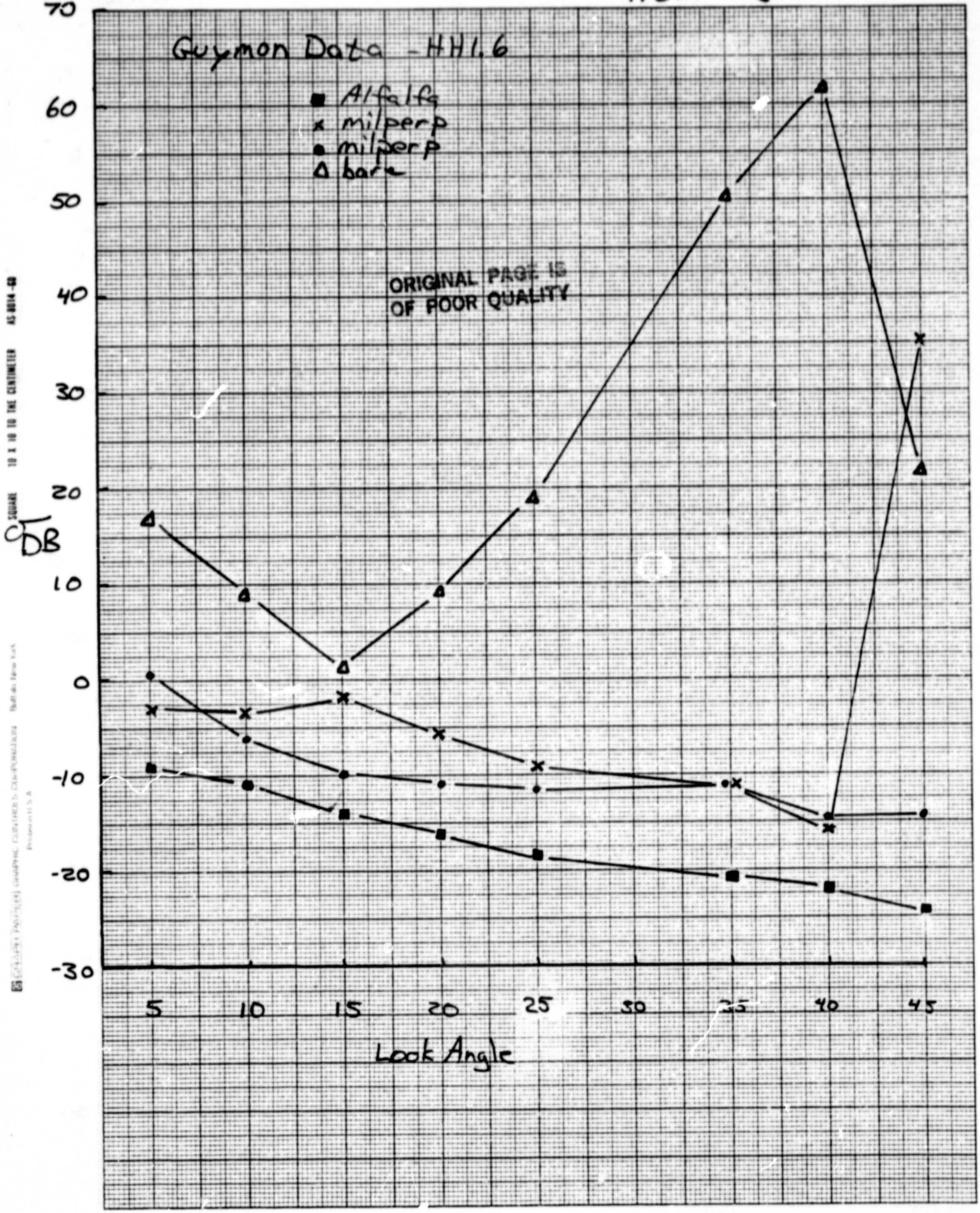
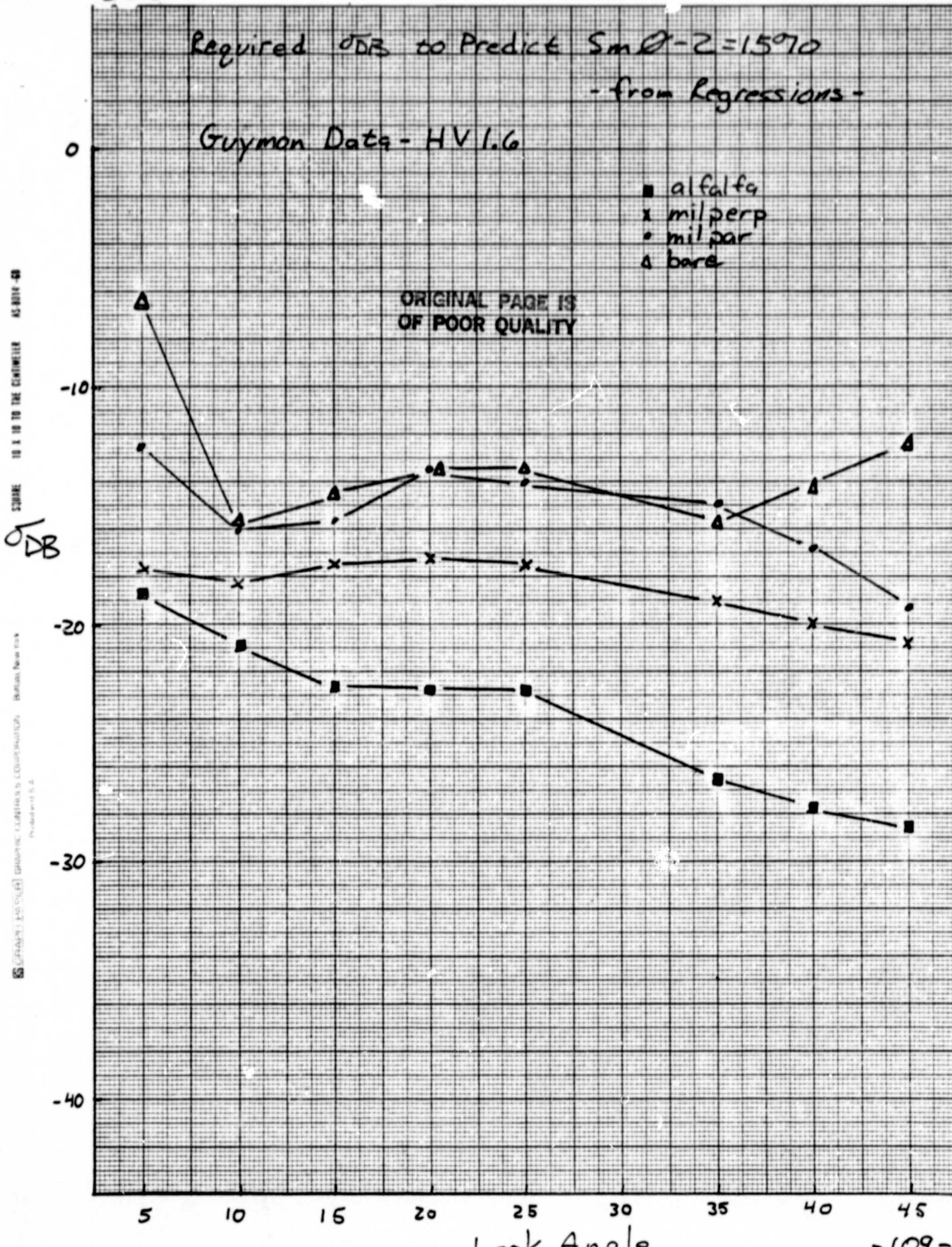


Fig 23c



Required σDB to Predict Sm Ø-2=15%
- from Regressions -
Guyman Data - HV 1.6
■ alfalfa
x milperp
• milpar
Δ bare
ORIGINAL PAGE IS
OF POOR QUALITY
0
-10
-20
-30
-40
σDB
5
10
15
20
25
30
35
40
45
Look Angle

Fig 23D

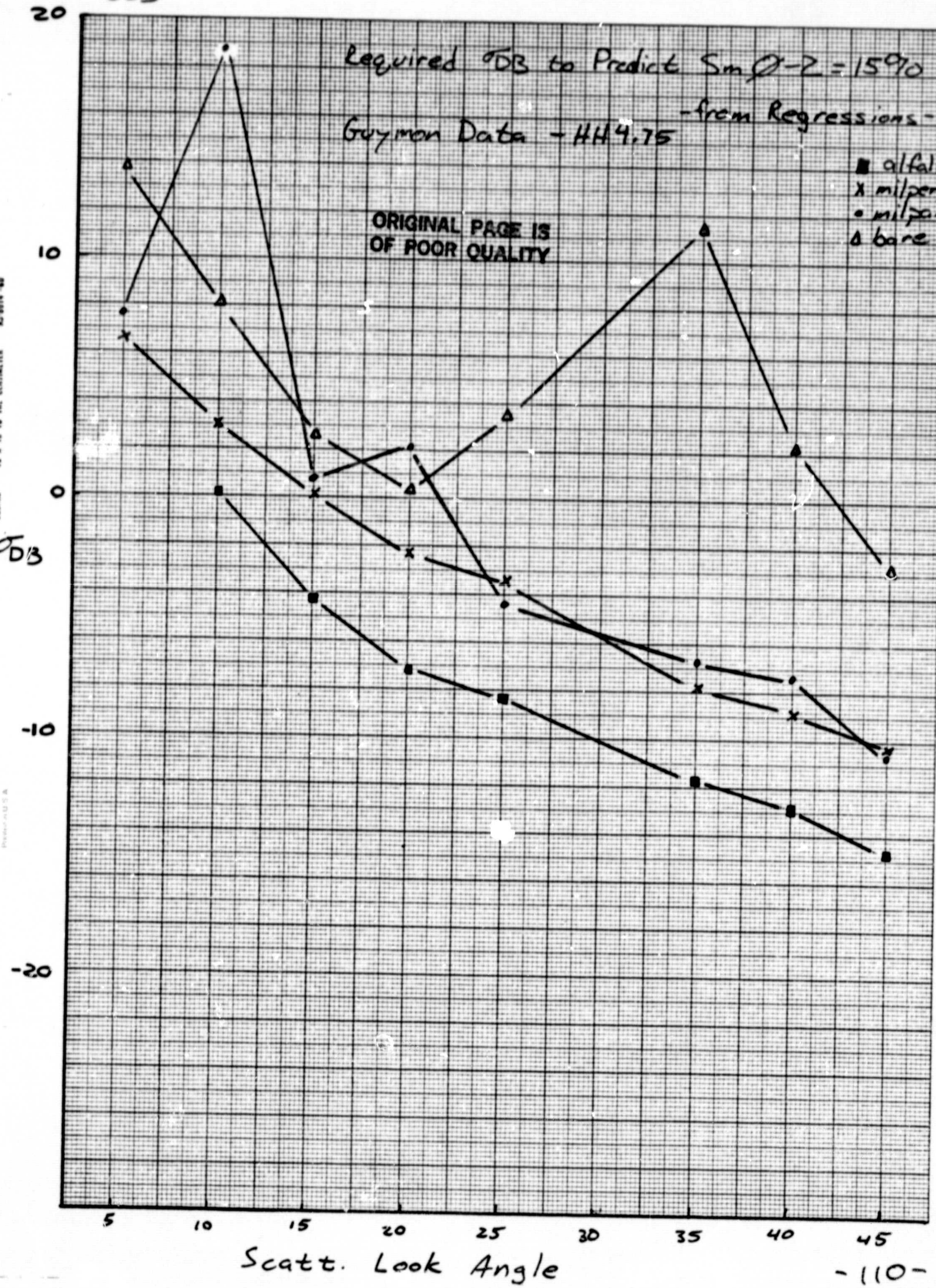

Required σDB to Predict Sm Ø-2 = 15%
-from Regressions-
Guymon Data - HH 4.75
■ alfalfa
x milperp
• milpar
Δ bare
ORIGINAL PAGE IS
OF POOR QUALITY
20
10
0
-10
-20
σDB
5
10
15
20
25
30
35
40
45
Scatt. Look Angle

Fig 23E

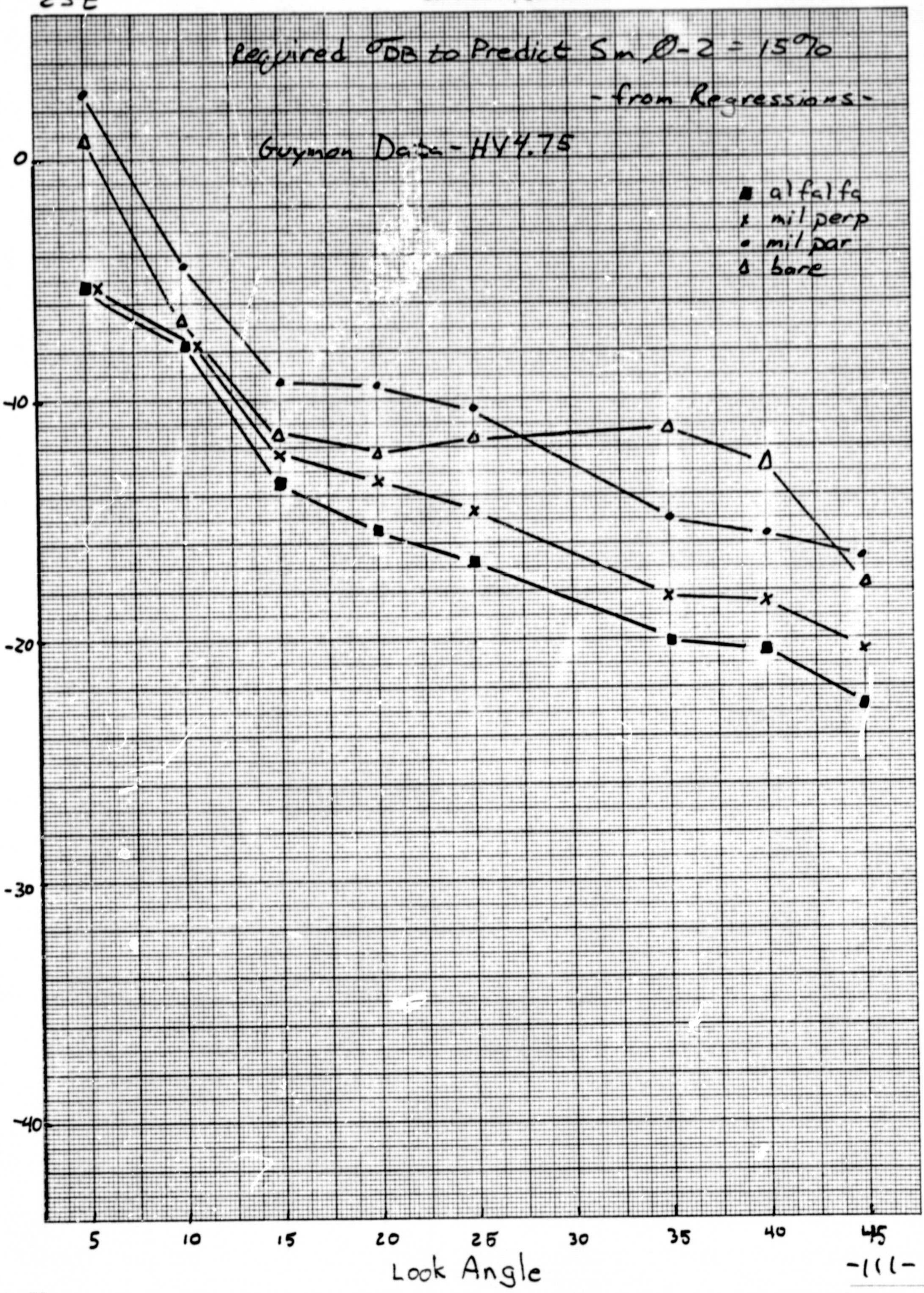

Required σDB to Predict Sm 0-2 = 15%
- from Regressions -
Guymon Data - HV 4.75
alfalfa
mil perp
mil par
bare
0
-10
-20
-30
-40
5
10
15
20
25
30
35
40
45
Look Angle

Fig 24 Required T_B°K to Predict SmØ-2

SmØ-2 = 0%

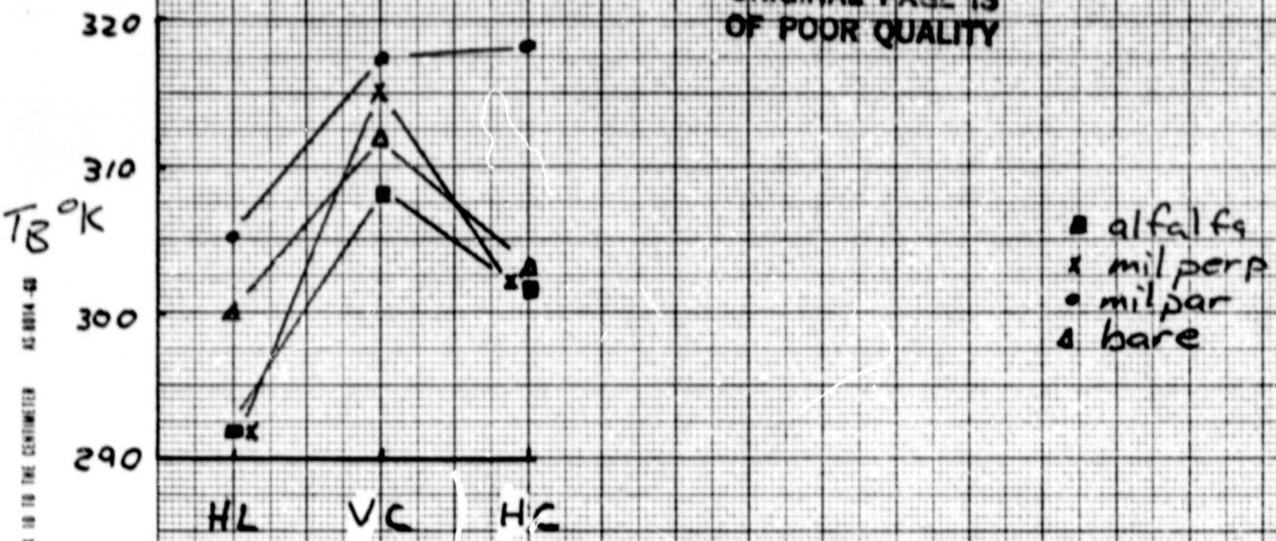


Fig G8f2

SmØ-2 = 5%

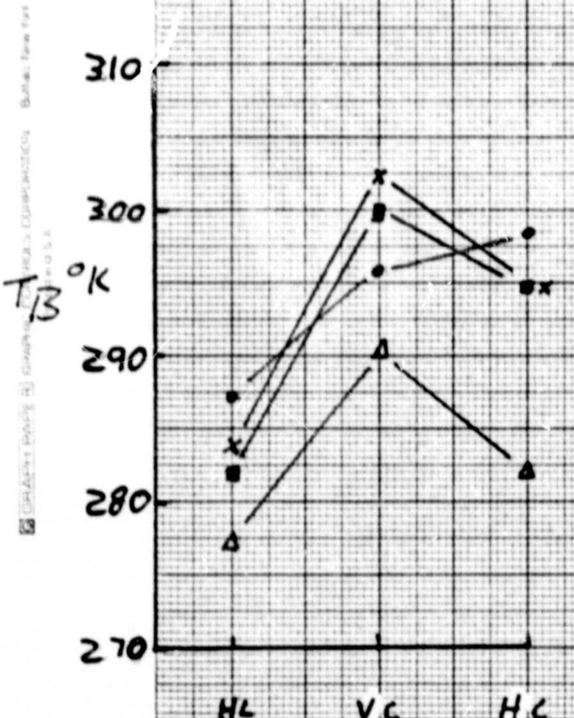


Fig G8f3

SmØ-2 = 15%

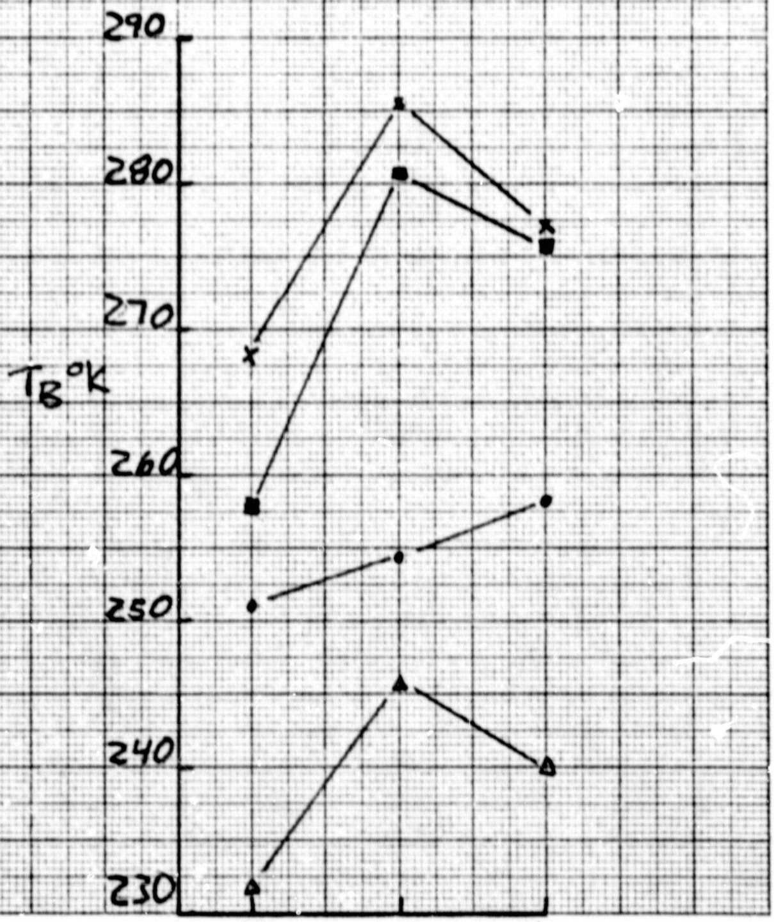


Fig 25A Required σ_{DB} to Predict FLD Ø-2 = 0%

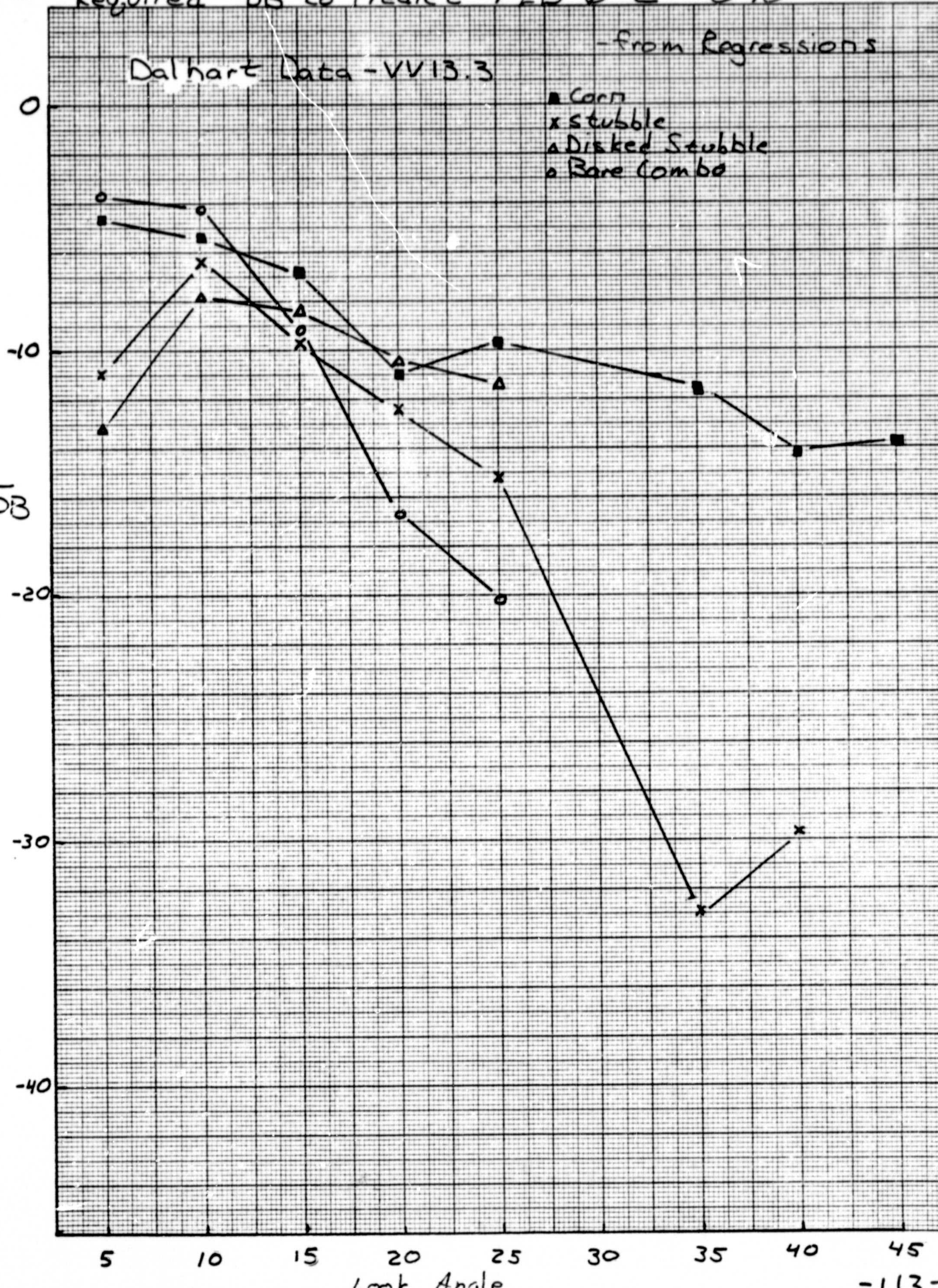


Fig 25B

Required σ_{DB} to Predict FLD Ø-2 = 090

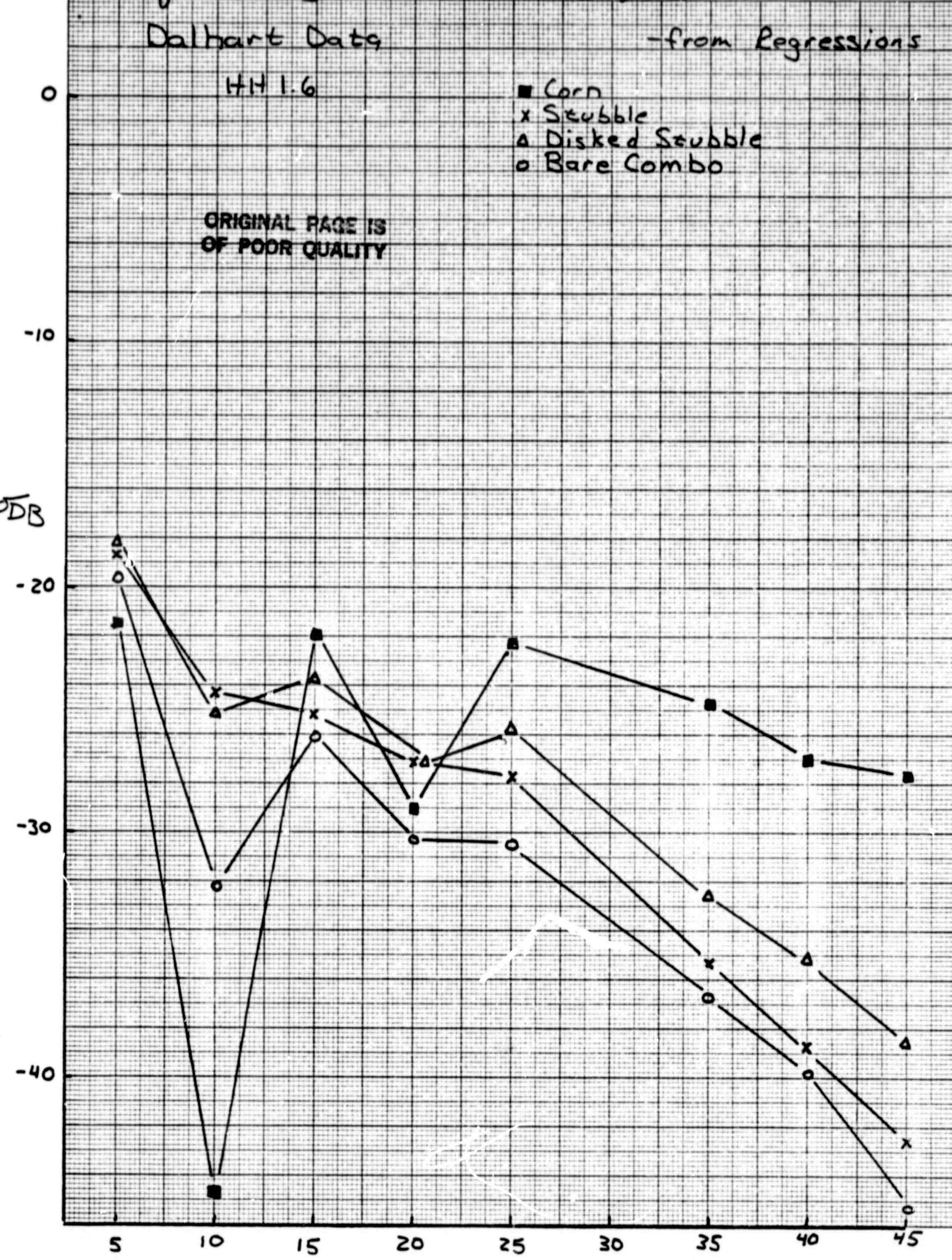


Fig 25c

Required σ_{DB} to Predict FLD Ø-2 =0%

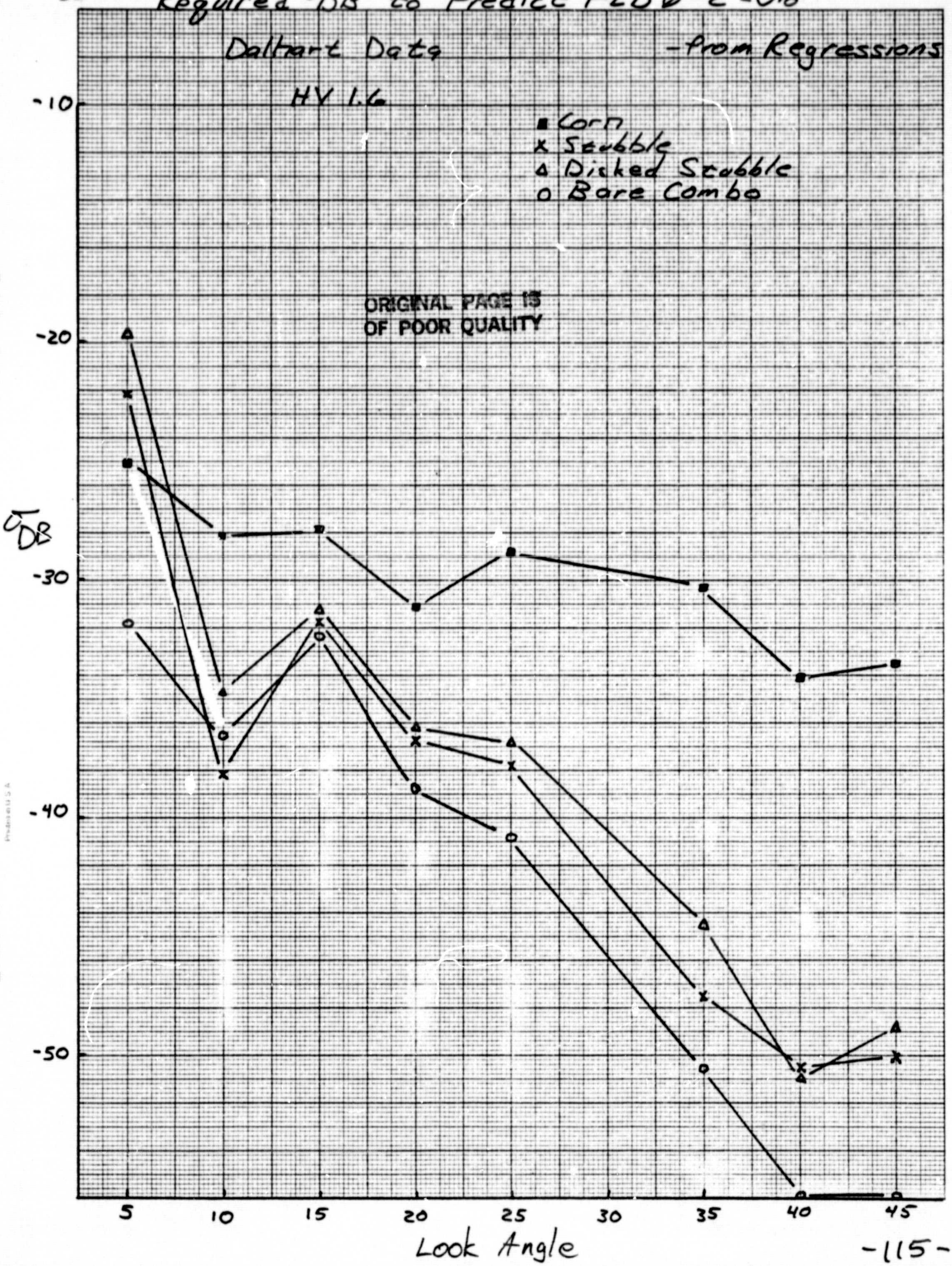
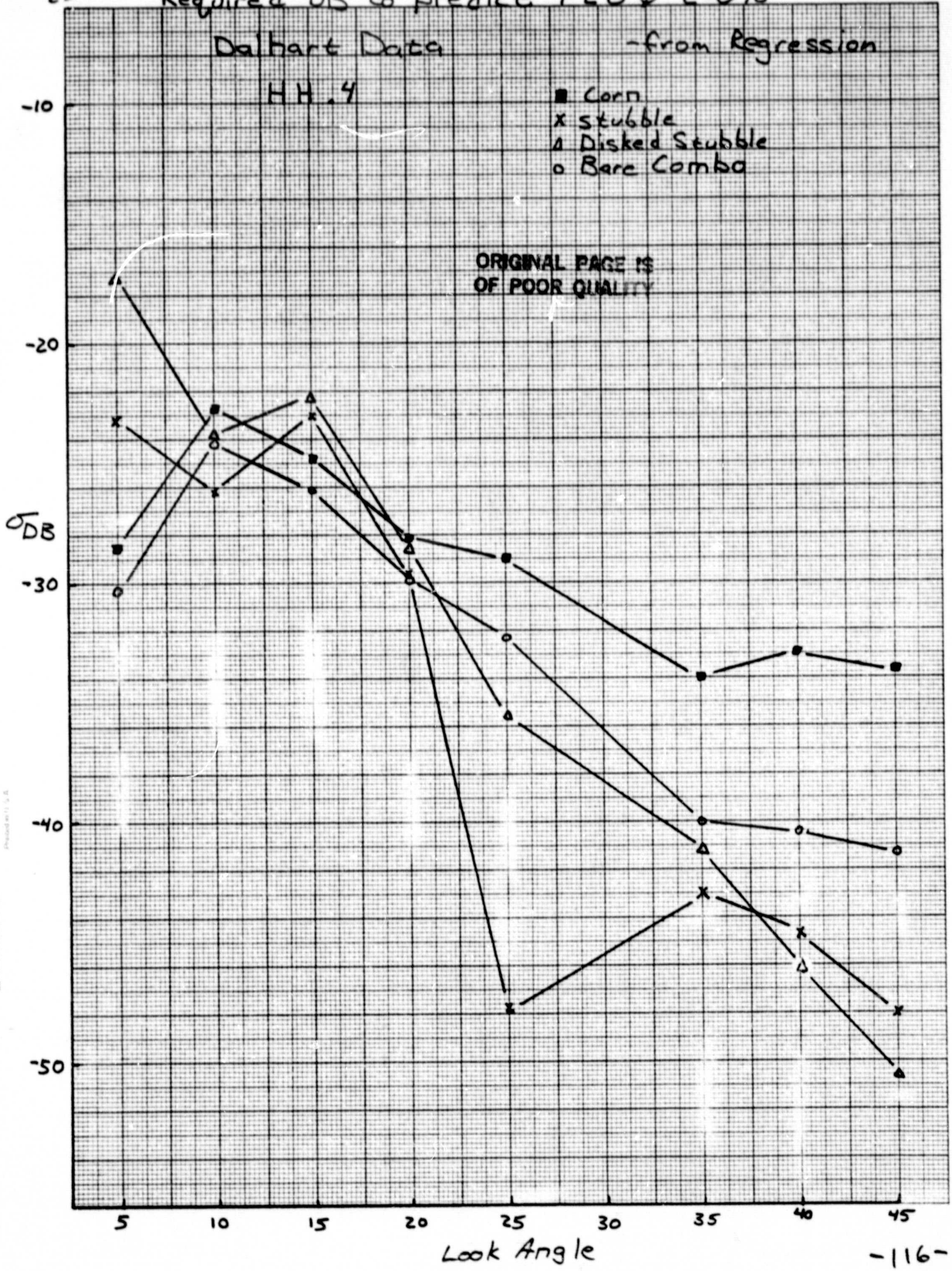


Fig 25D Required σ_{DB} to predict FLD ϕ-2=0%



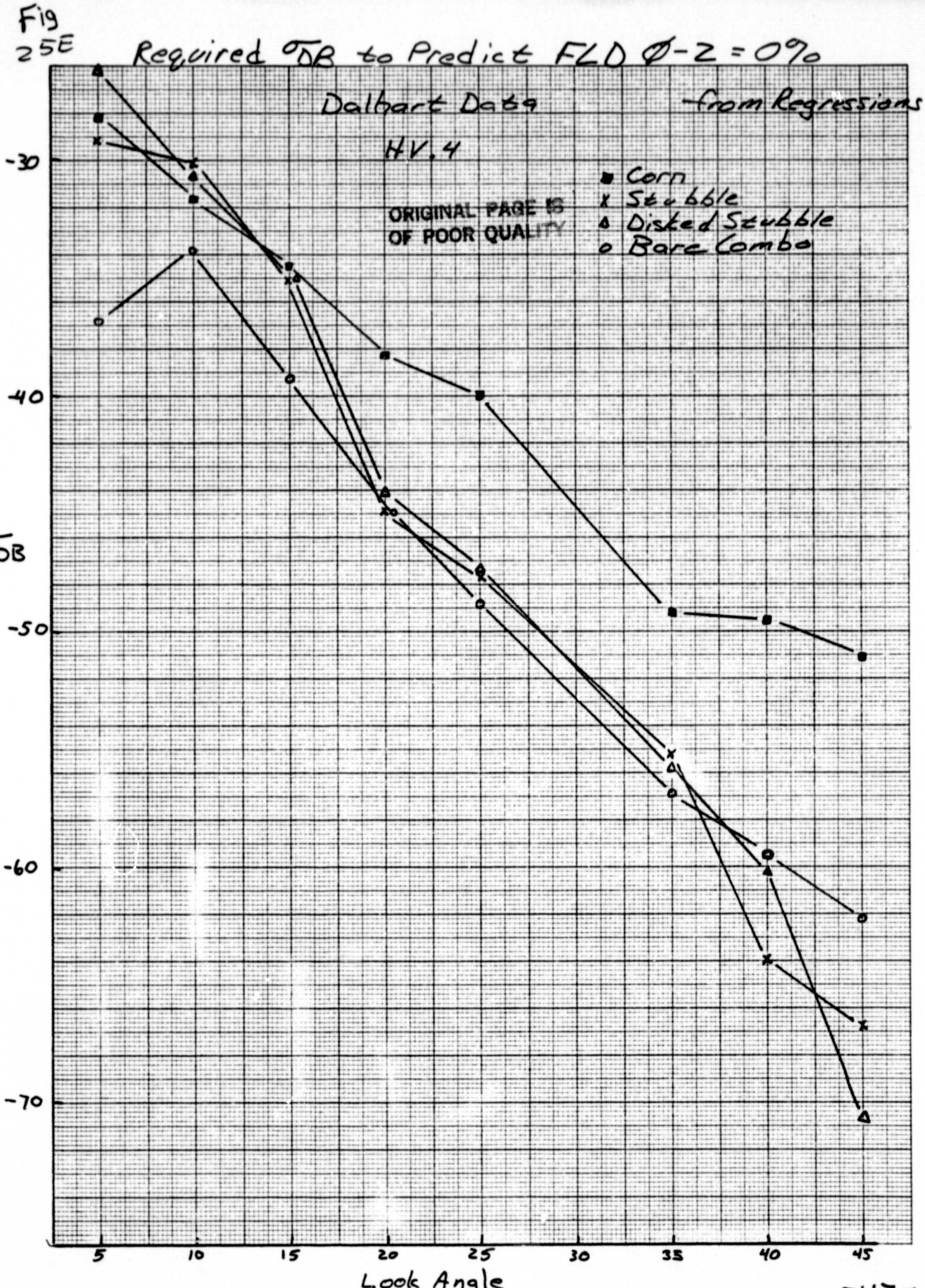
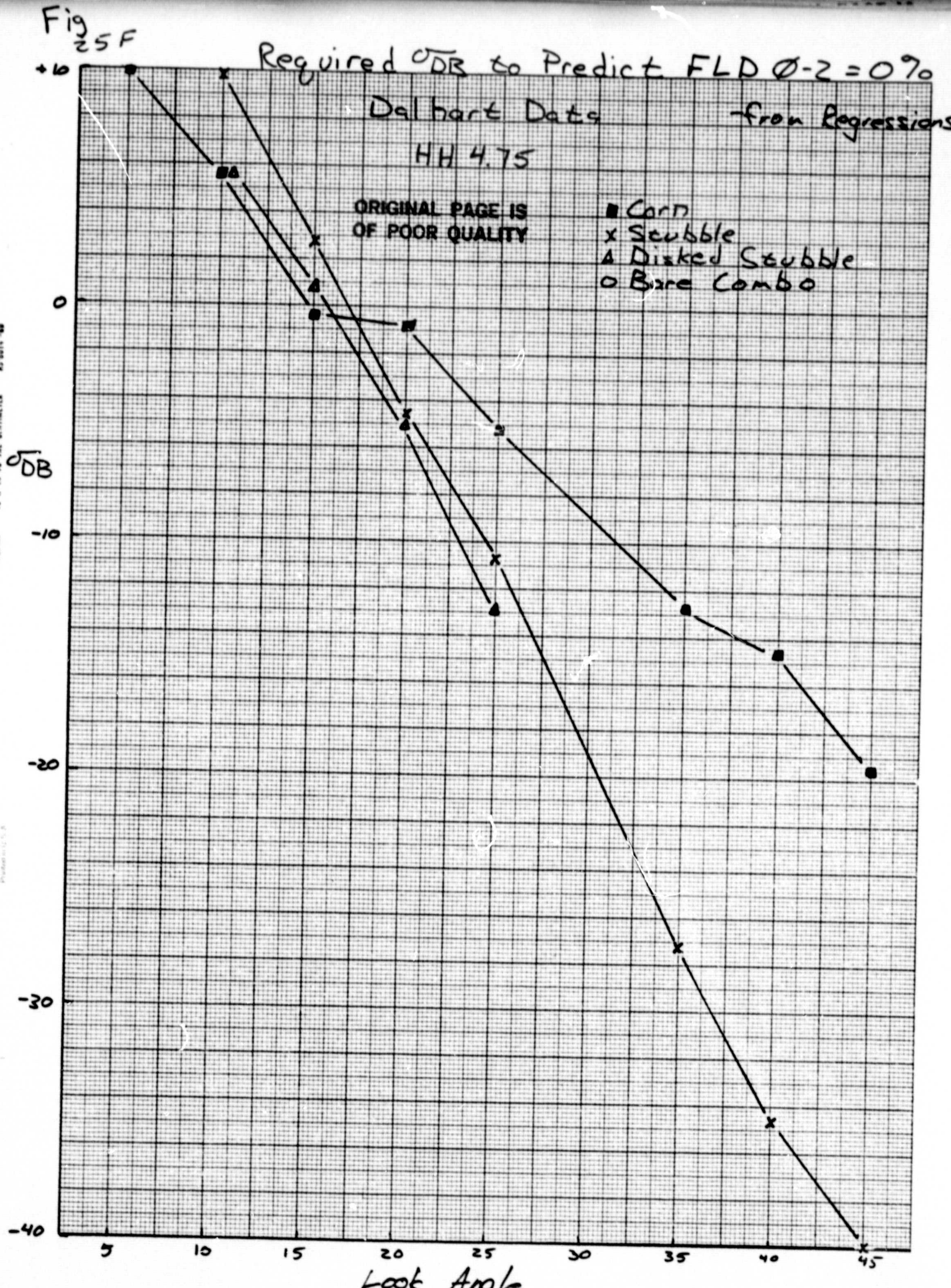


Fig 25E
Required σ_{DB} to Predict FLD Ø-Z = 0%
Dalhart Data
from Regressions
HV.4
Corn
Stubble
Disked Stubble
Bare Combo
ORIGINAL PAGE IS OF POOR QUALITY
-30
-40
-50
-60
-70
σ_{DB}
5
10
15
20
25
30
35
40
45
Look Angle



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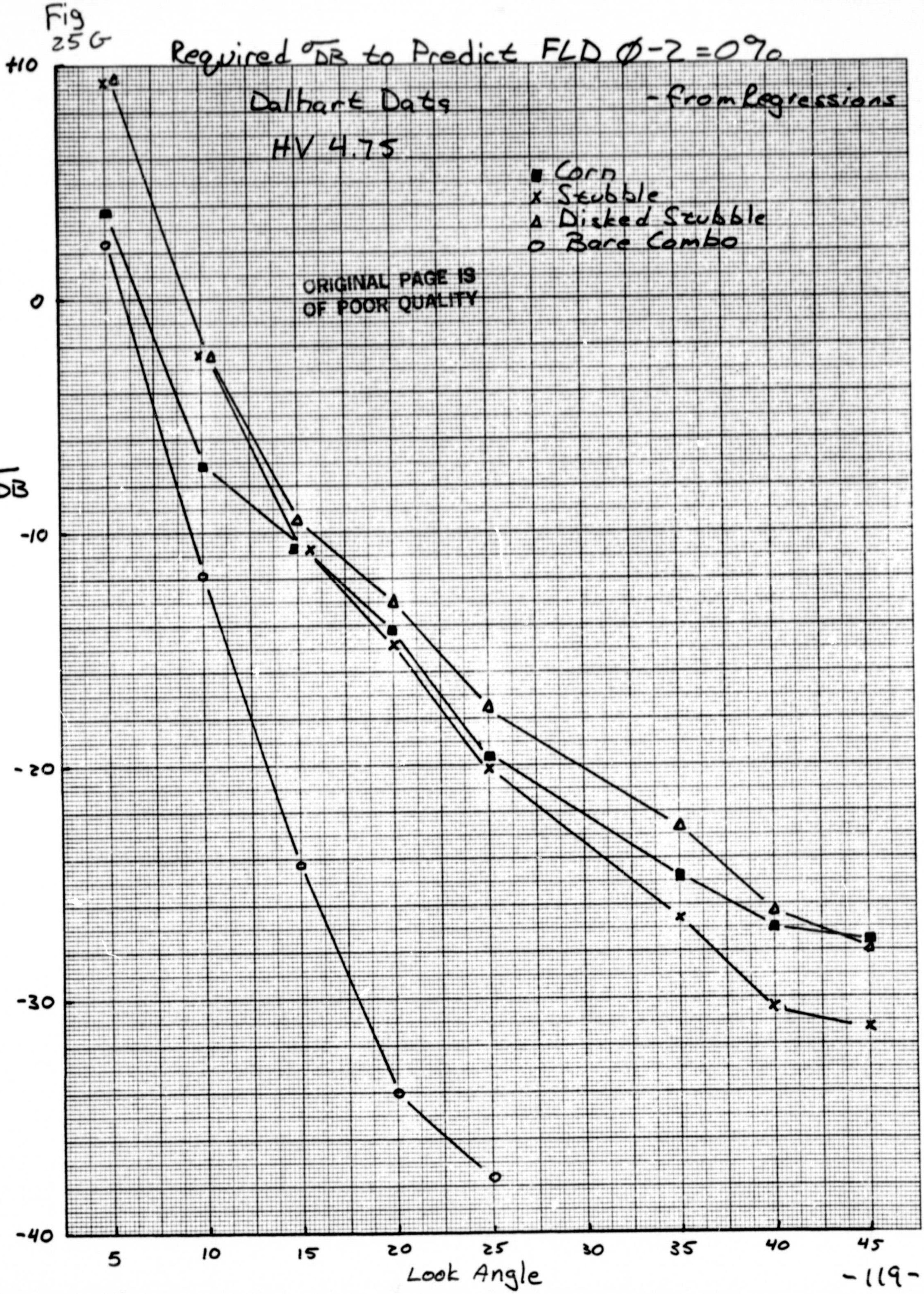


Fig 25G
Required σDB to Predict FLD Ø-2 = 0%
Dalhart Data
HV 4.75
- from Regressions
Corn
Stubble
Disked Stubble
Bare Combo
ORIGINAL PAGE IS OF POOR QUALITY
σDB
+10
0
-10
-20
-30
-40
5
10
15
20
25
30
35
40
45
Look Angle
SQUARE 10 X 10 TO THE CENTIMETER AS-0014-40
GRAPH PAPER GRAPHIC CONTROLS CORPORATION Buffalo, New York
Printed in U.S.A.

Fig 26A

Required σ_{DB} to Predict FLD Ø-2=5%

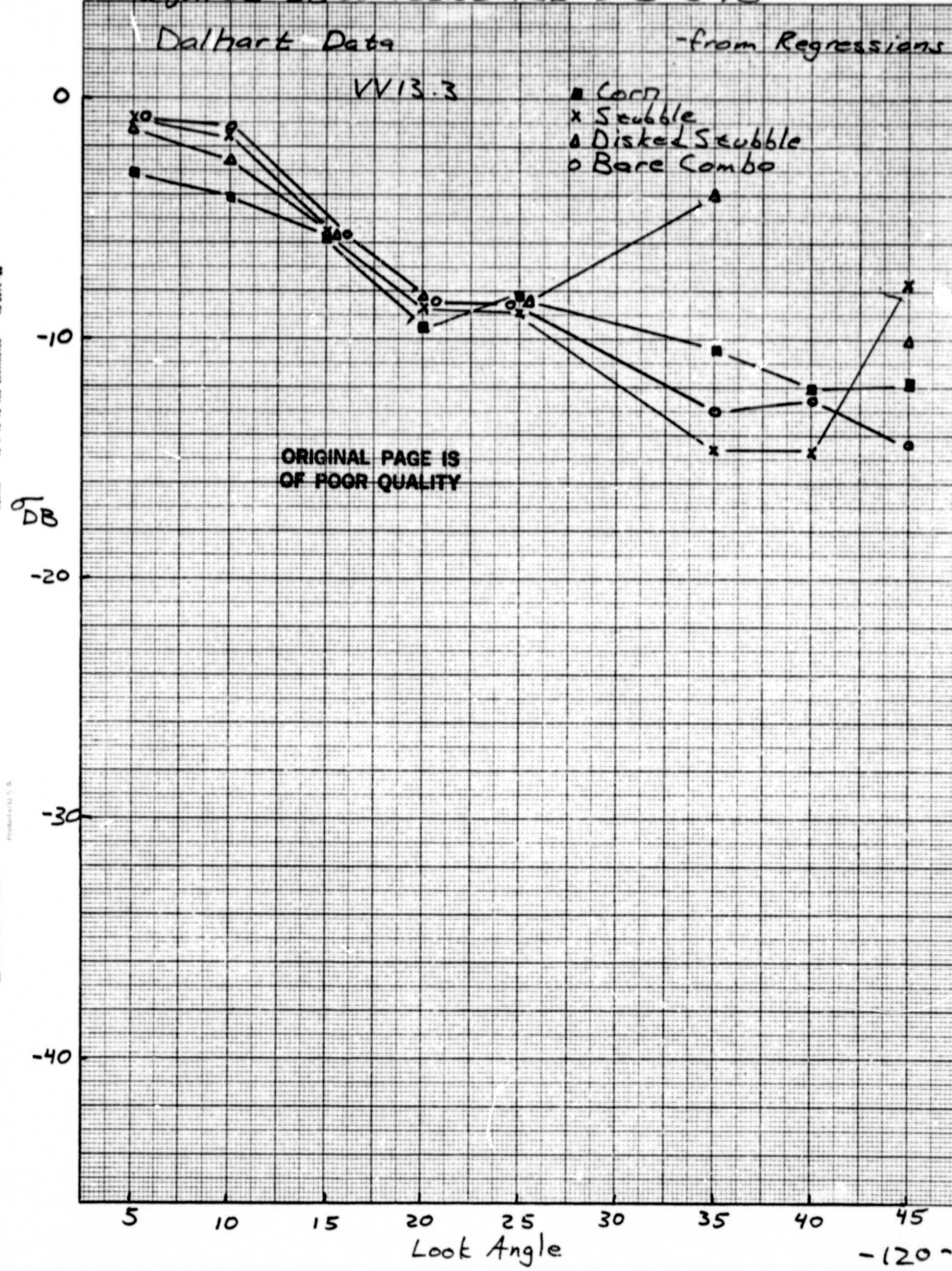


Fig 26B Required σ_{DB} to Predict FLD Ø-2 = 5%

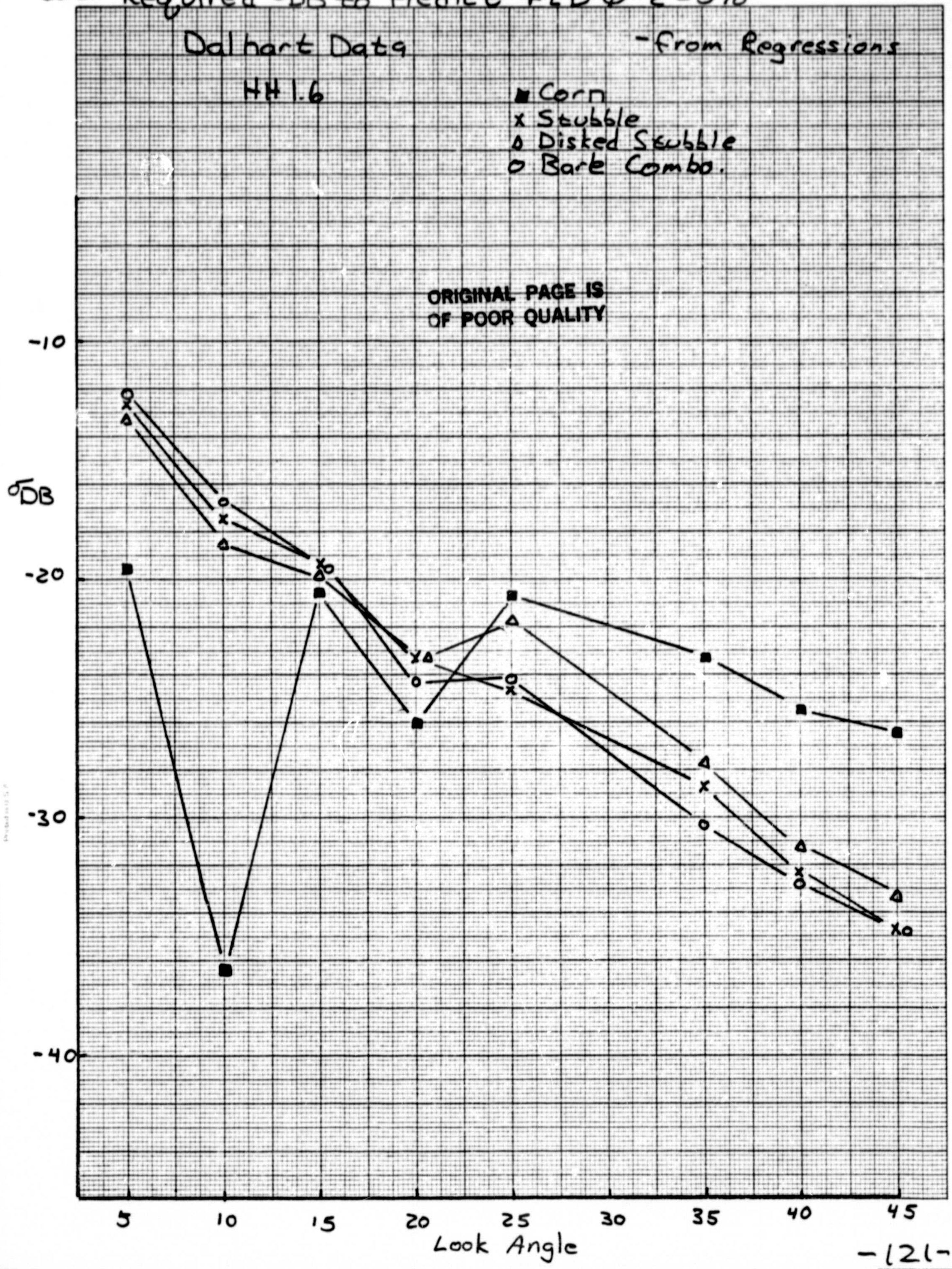


Fig 26C Required σ_{DB} to Predict FLD Ø-2 = 5%

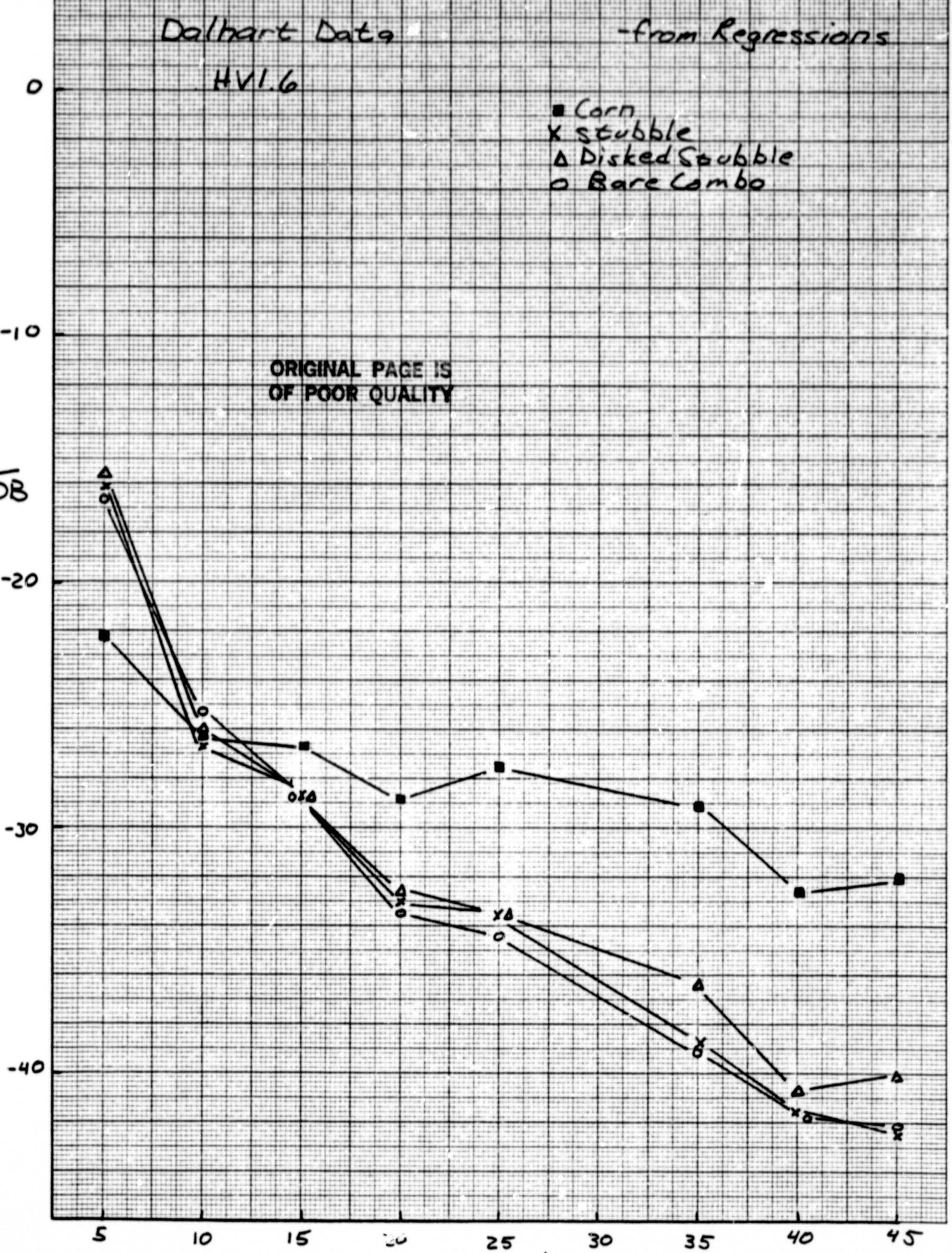


Fig 26D Required σDB to Predict FLD = 5%

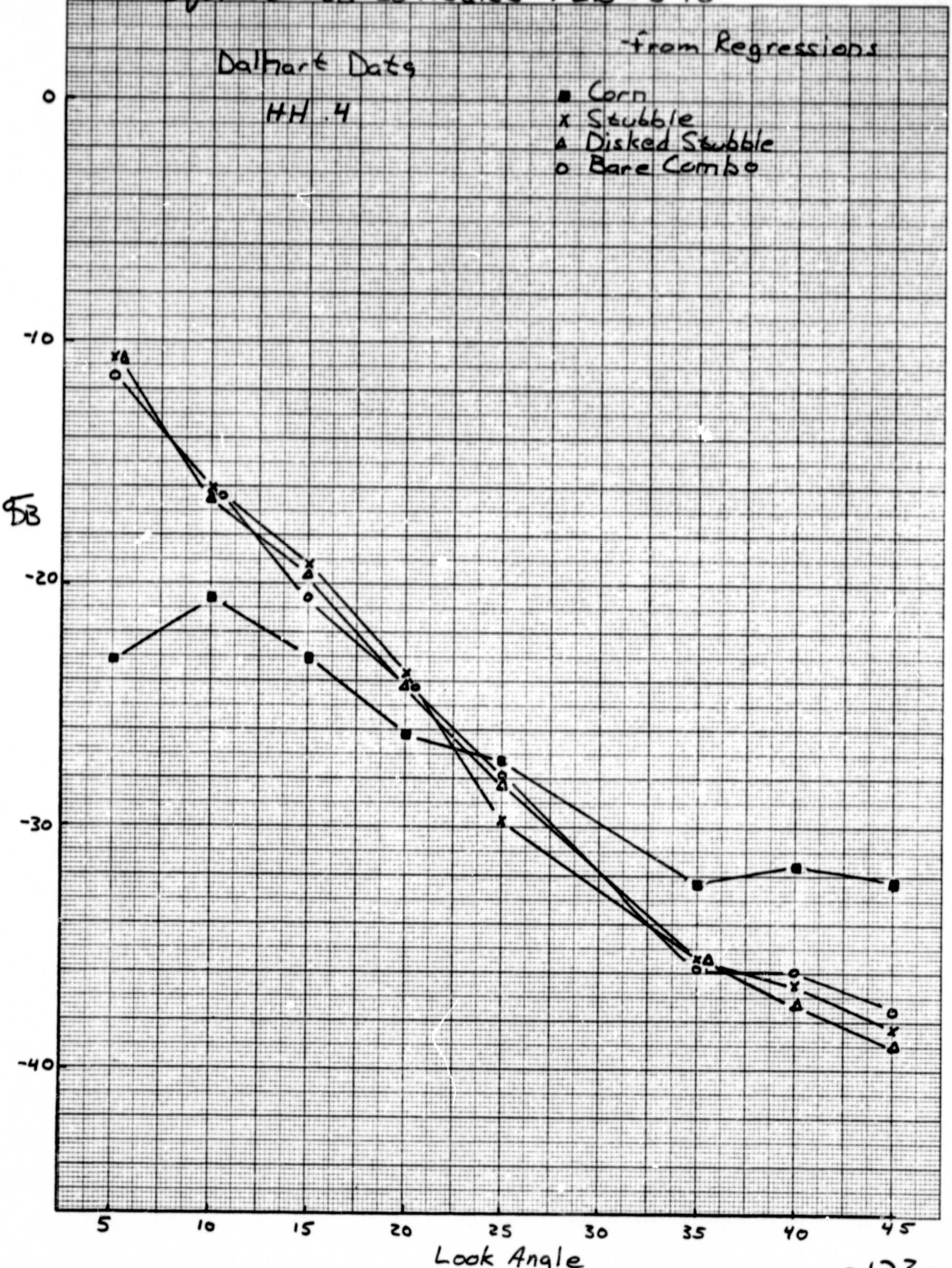
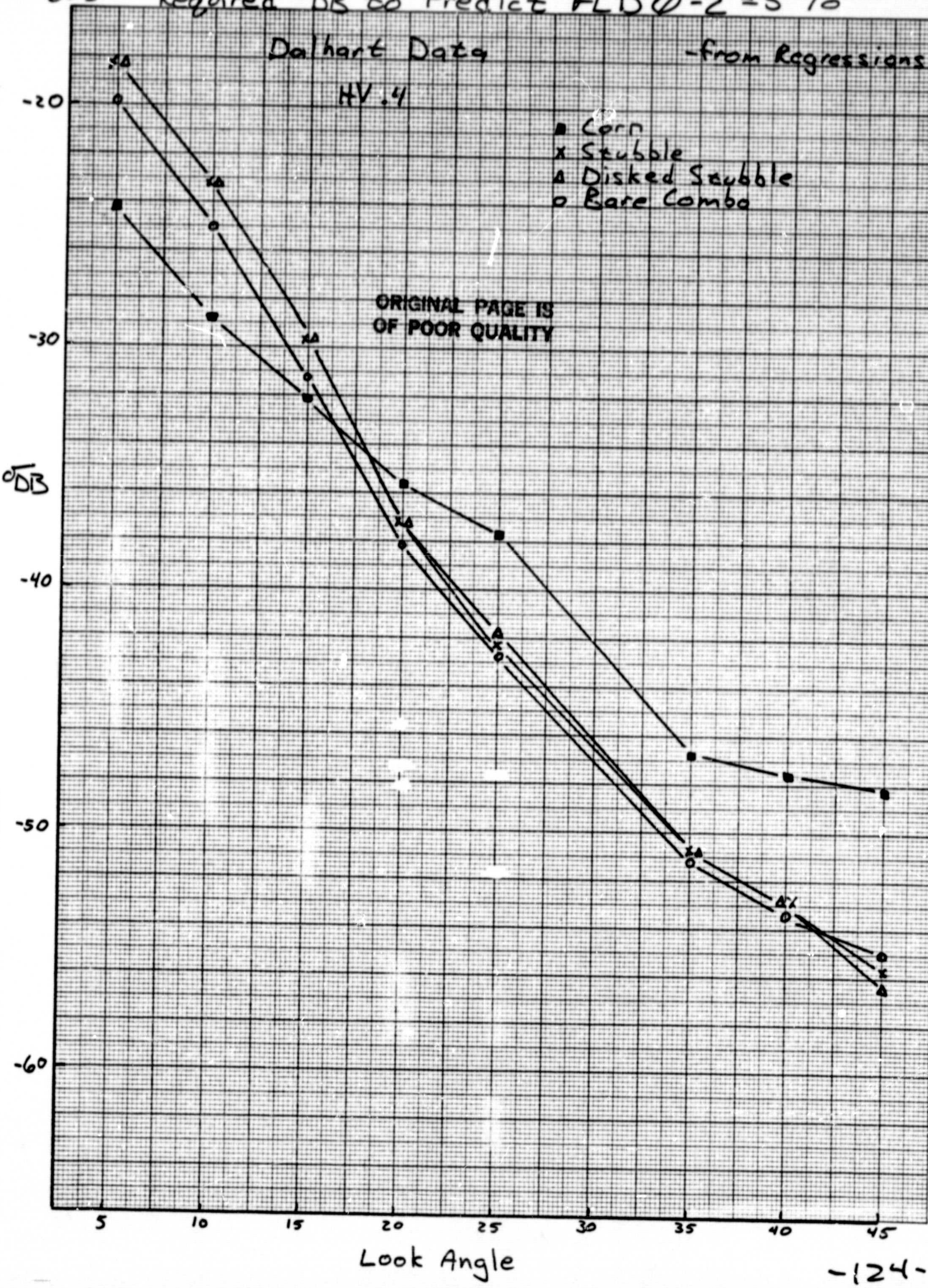


Fig 26E Required σ_{DB} to Predict FLDØ-2 = 5%



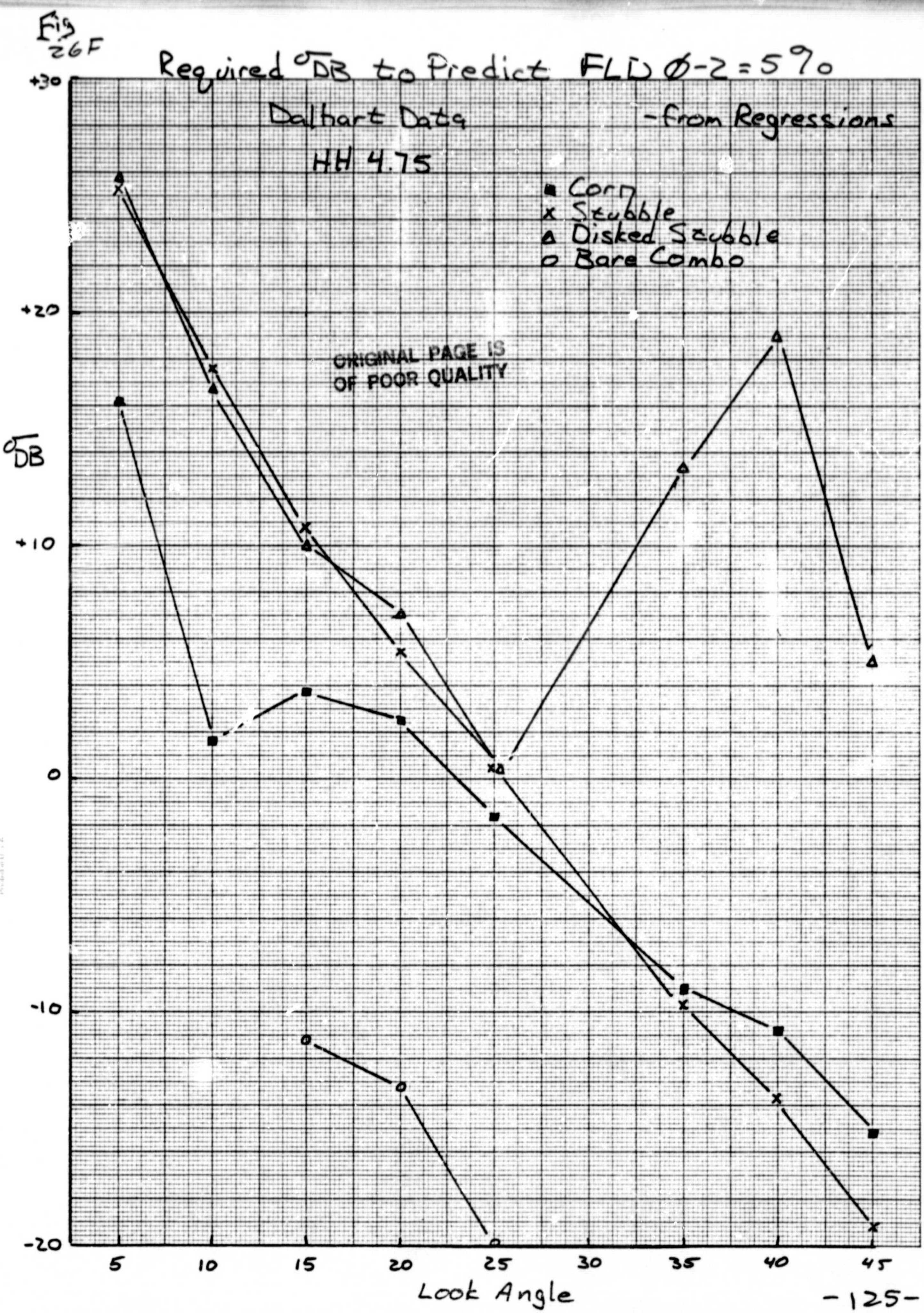


Fig 26F
Required σ_{DB} to Predict FLD Ø-2 = 5%
Dalhart Data
- from Regressions
HH 4.75
■ Corn
x Stubble
Δ Disked Stubble
o Bare Combo
ORIGINAL PAGE IS OF POOR QUALITY
σ_{DB}
+30
+20
+10
0
-10
-20
5
10
15
20
25
30
35
40
45
Look Angle

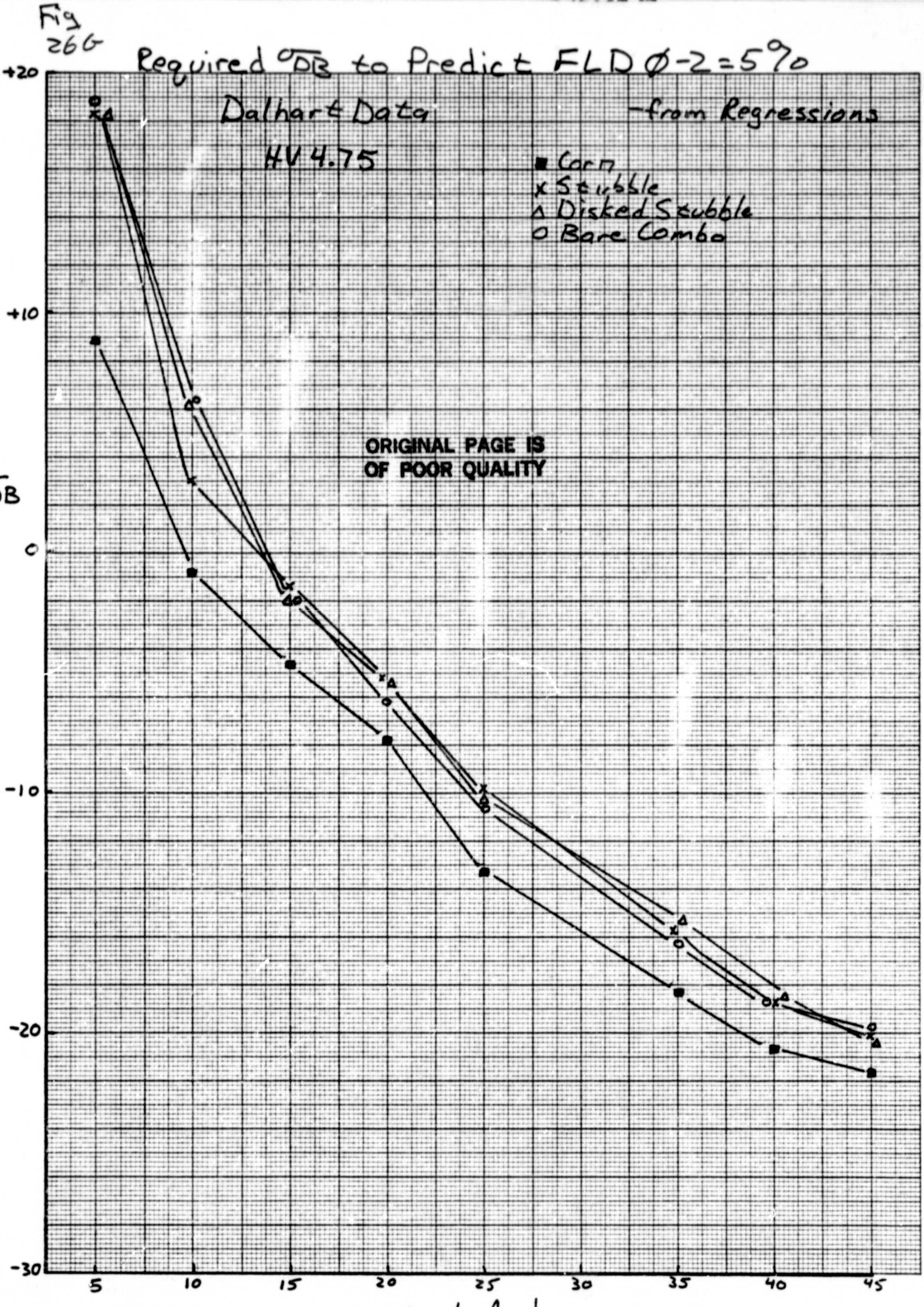


Fig 26G
Required σ_{DB} to Predict FLD Ø-2=5%
Dalhart Data
-from Regressions
HV 4.75
■ Corn
x Stubble
Δ Disked Stubble
o Bare Combo
ORIGINAL PAGE IS OF POOR QUALITY
σ_{DB}
+20
+10
0
-10
-20
-30
5
10
15
20
25
30
35
40
45
Look Angle

Fig 27A Required σ_{DB} to Predict FLD Ø-2 = 15%

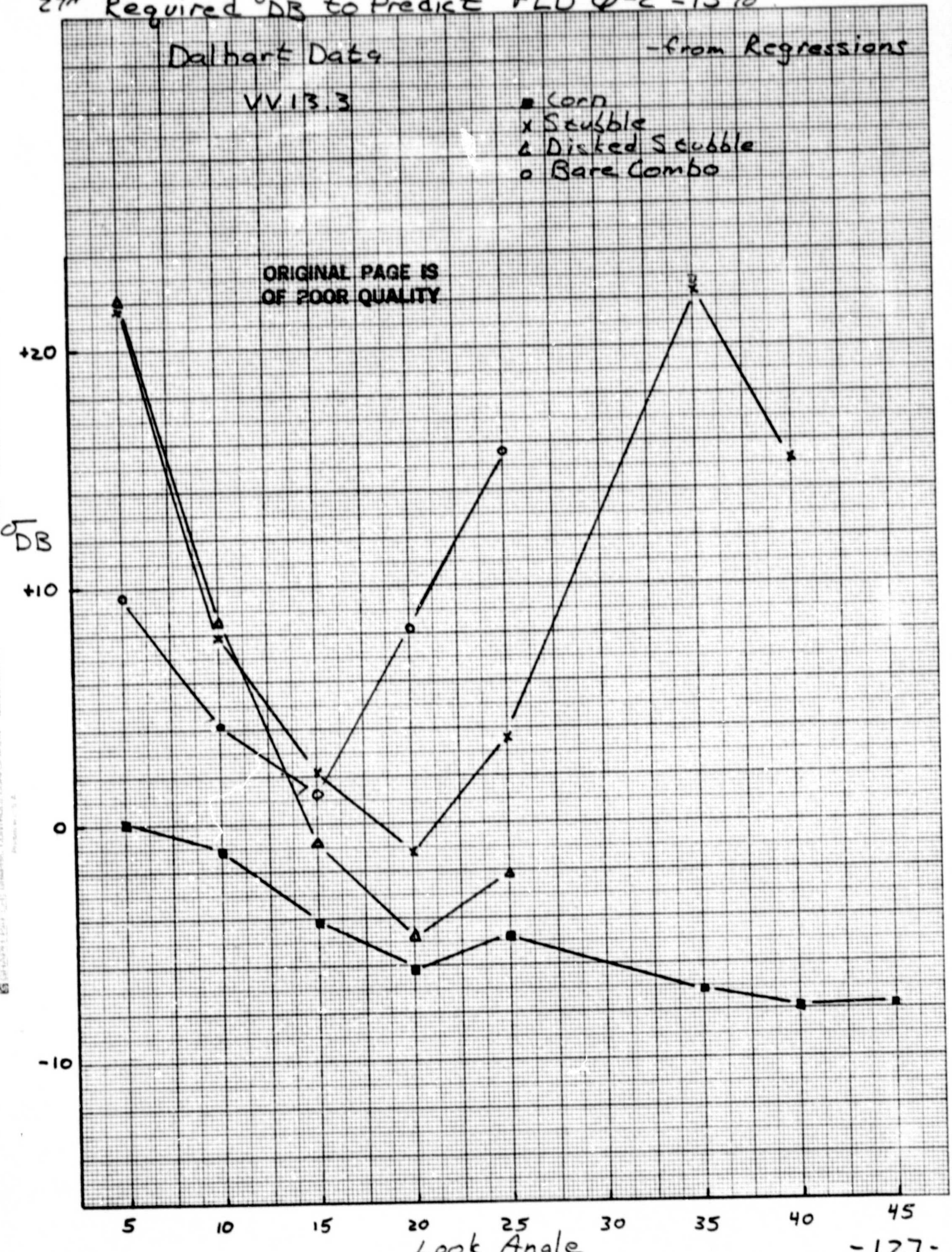


Fig 27B

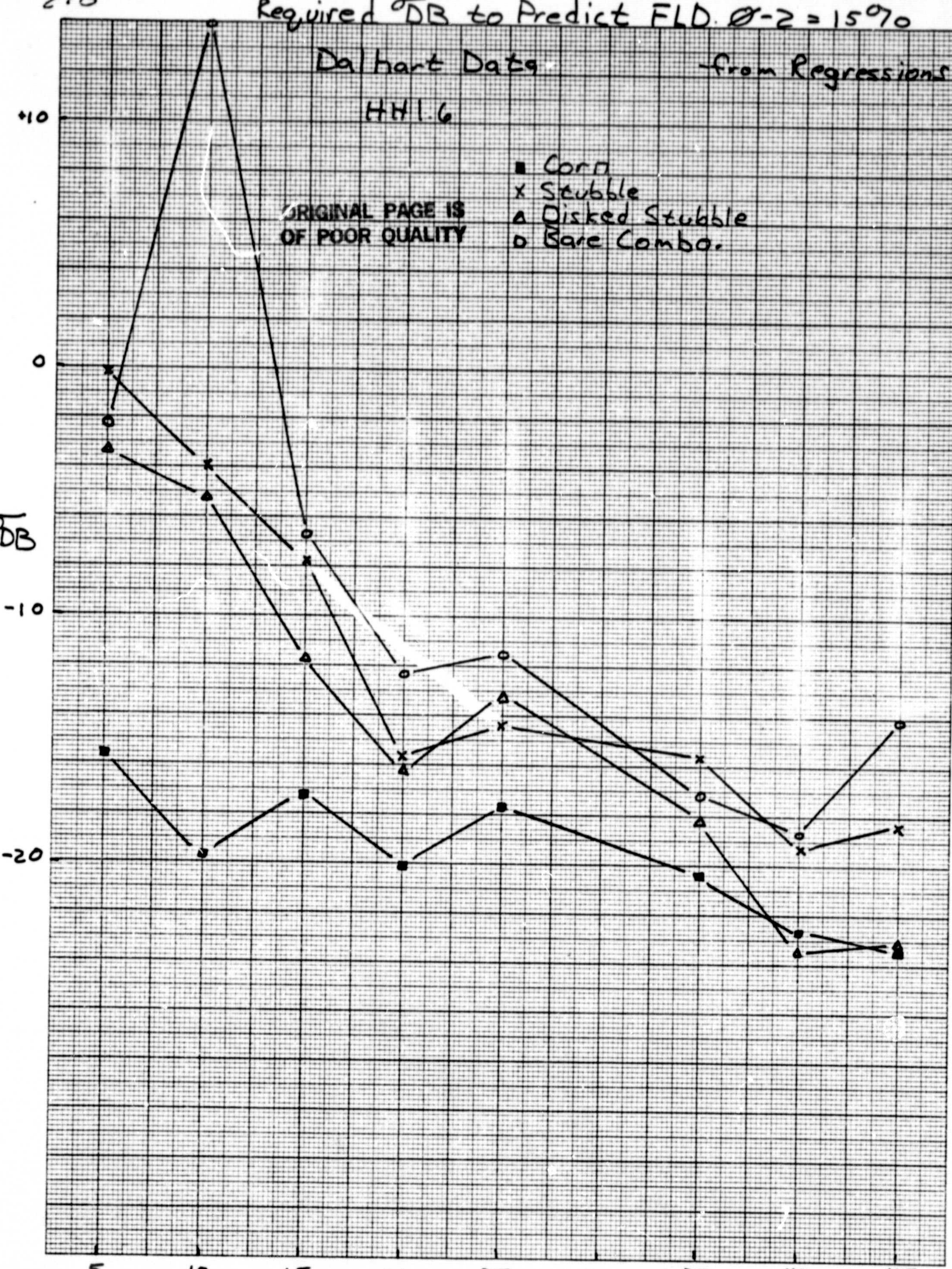


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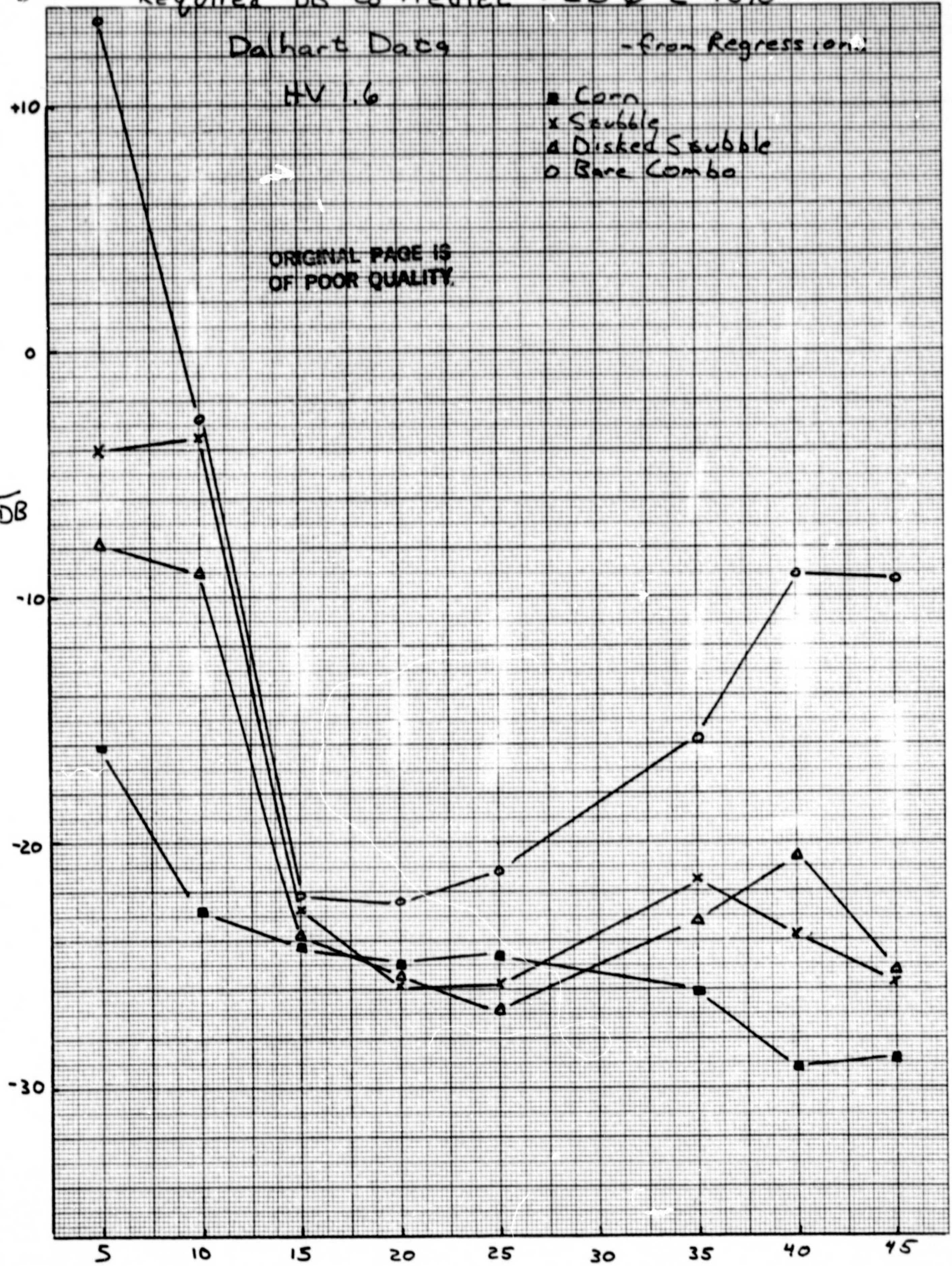
Fig 27c

Required σ_{DB} to Predict FLD Ø-Z=15%



Look Angle

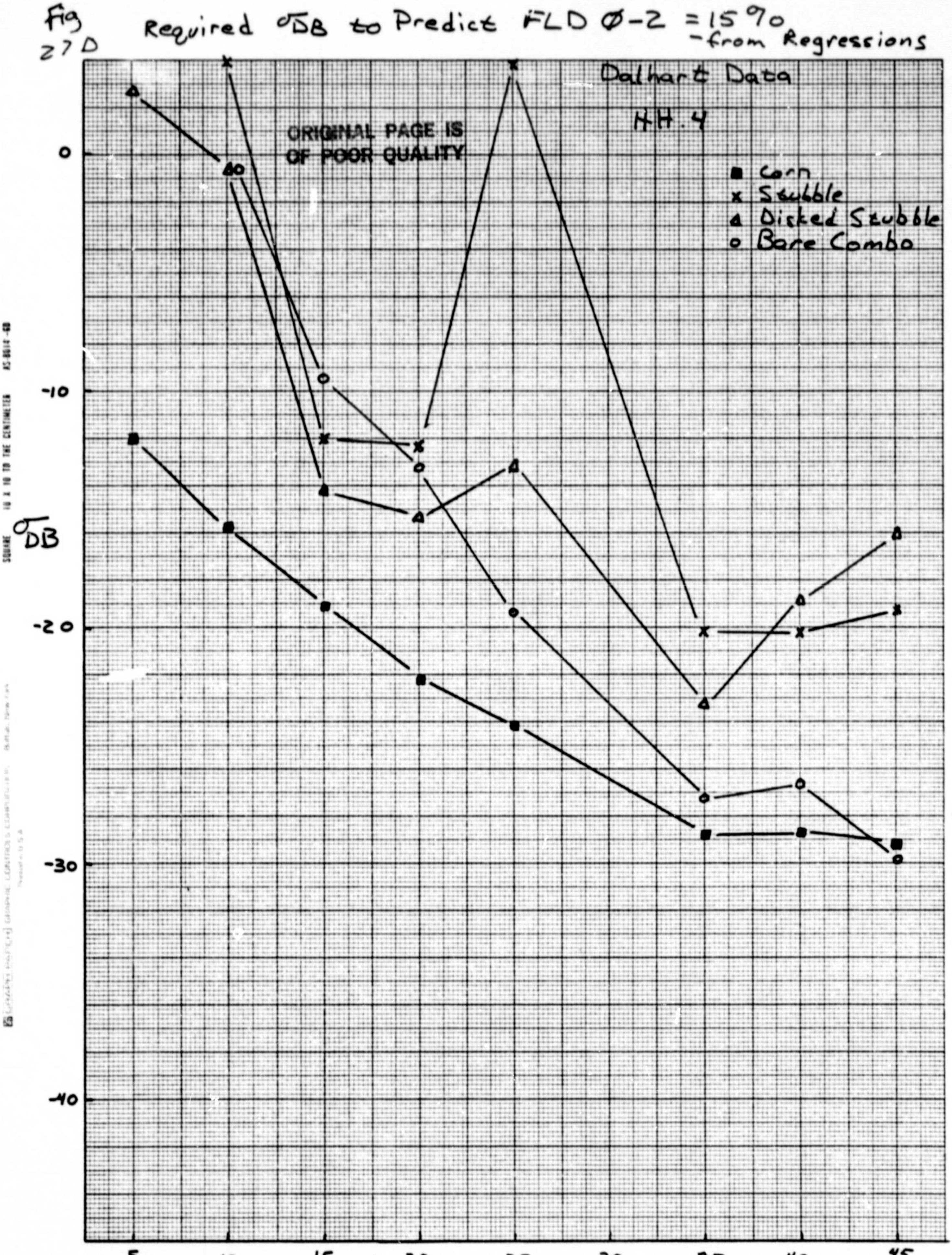


Fig 27D
Required σ_{DB} to Predict FLD Ø-2 = 15%
-from Regressions
Dalhart Data
HH. 4
ORIGINAL PAGE IS OF POOR QUALITY
■ Corn
x Stubble
Δ Disked Stubble
o Bare Combo
σ_{DB}
0
-10
-20
-30
-40
5
10
15
20
25
30
35
40
45
Look Angle

Fig 27E Required σ^{o}_{DB} to Predict FLD Ø-Z = 15%

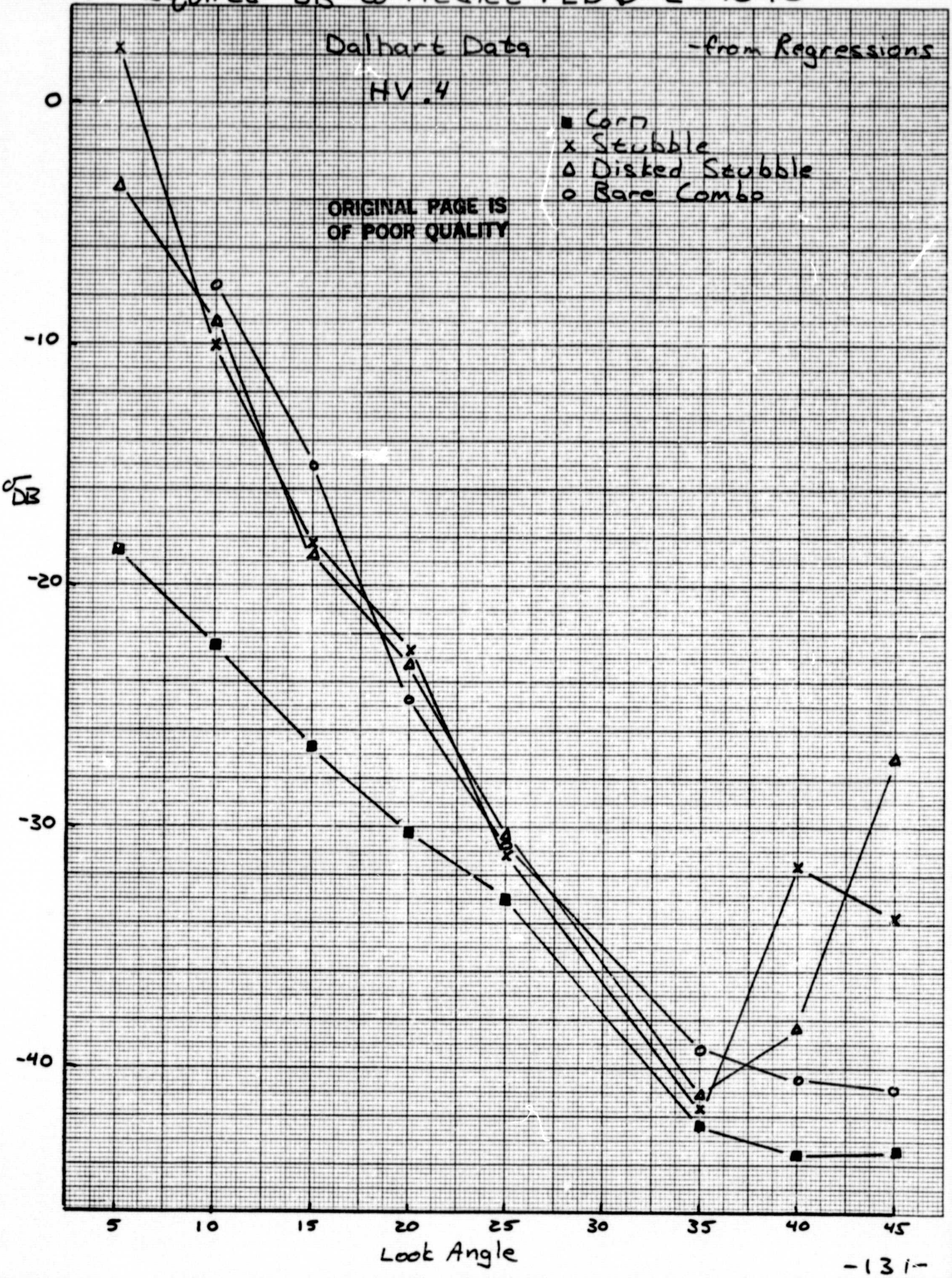


Fig 27F

Required σ_{DB} to Predict FLD Ø-2=15%

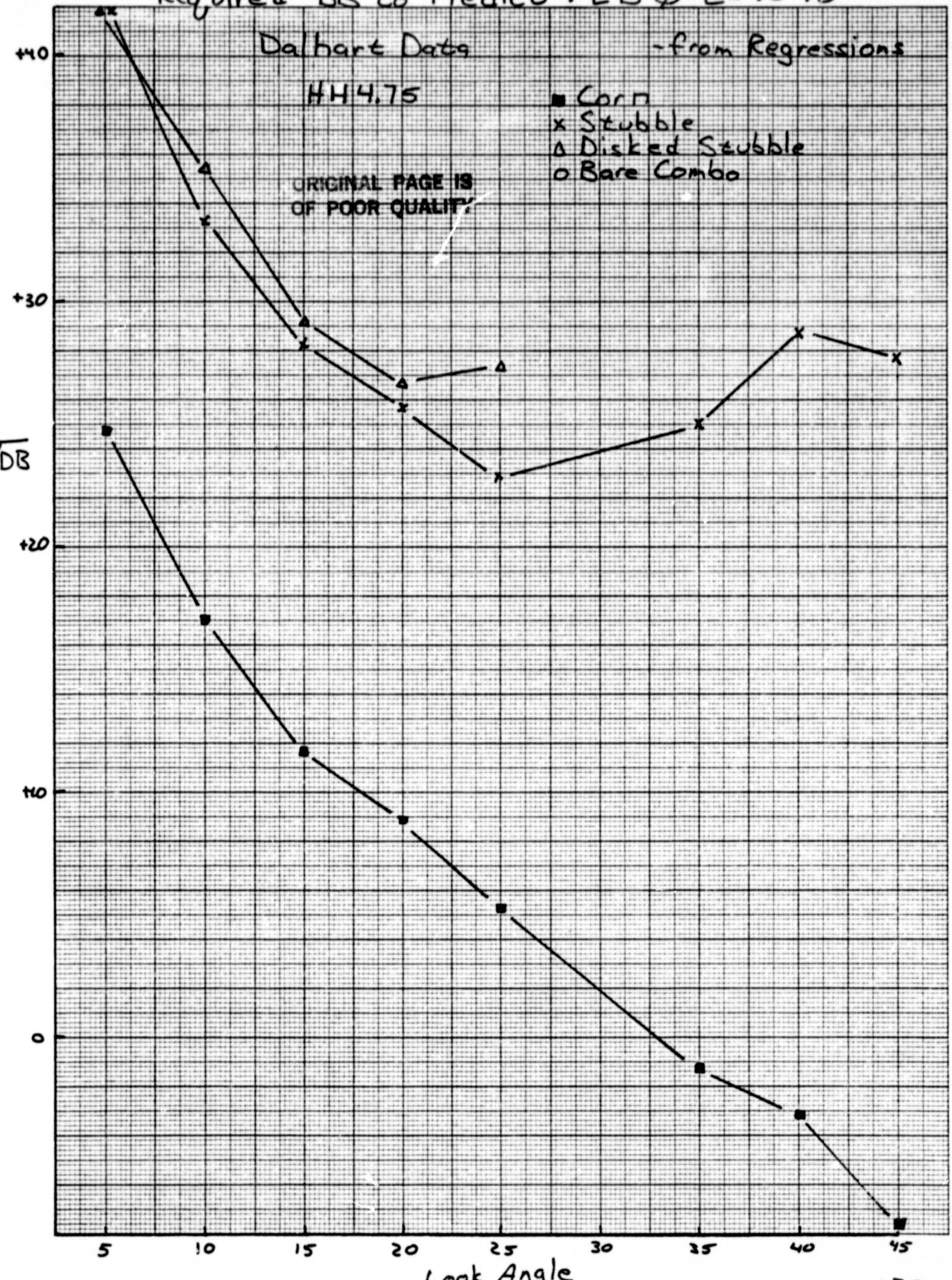


Fig 27G

Required σ_{DB} to Predict FLD ϕ-Z = 15%

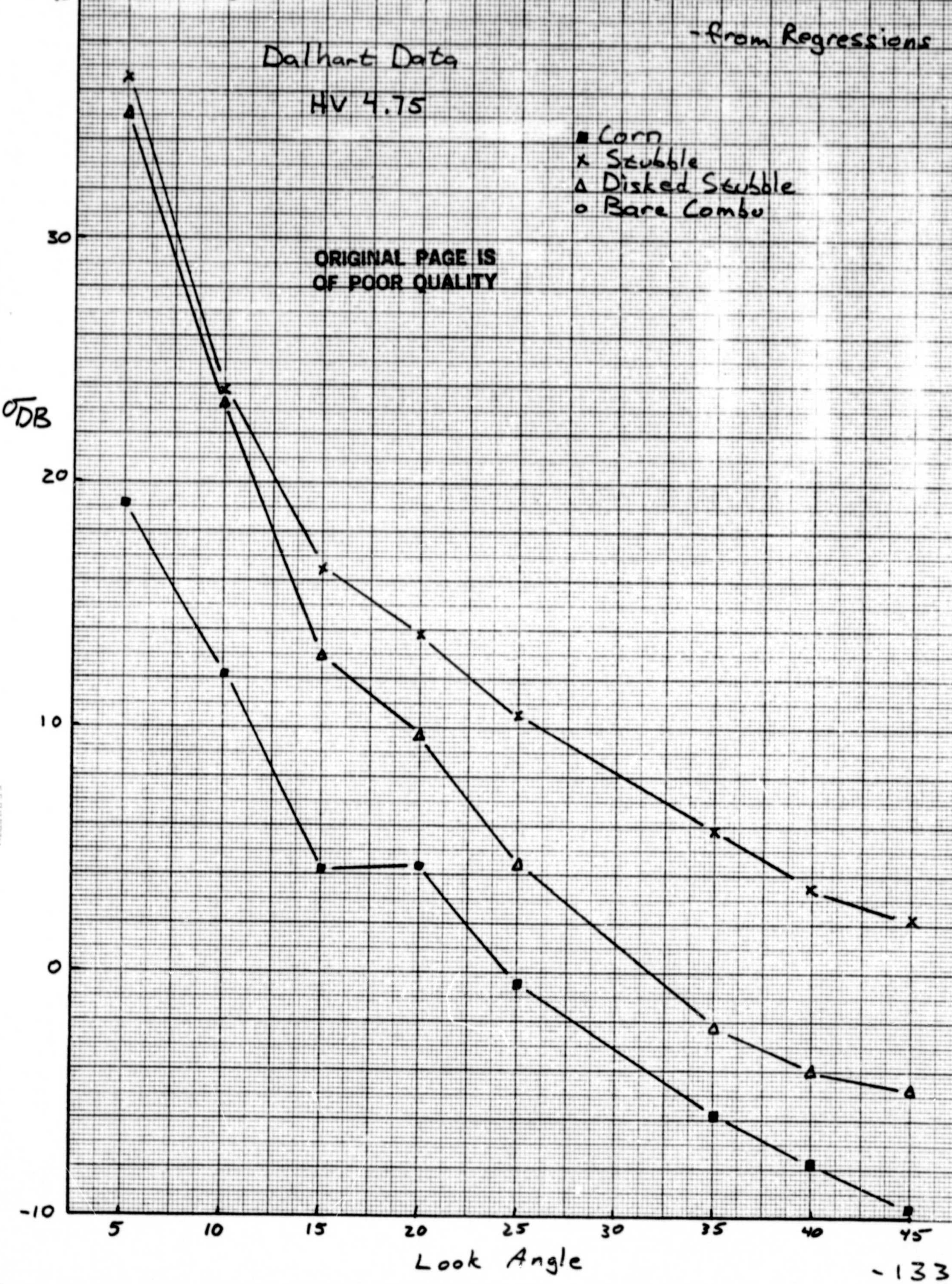
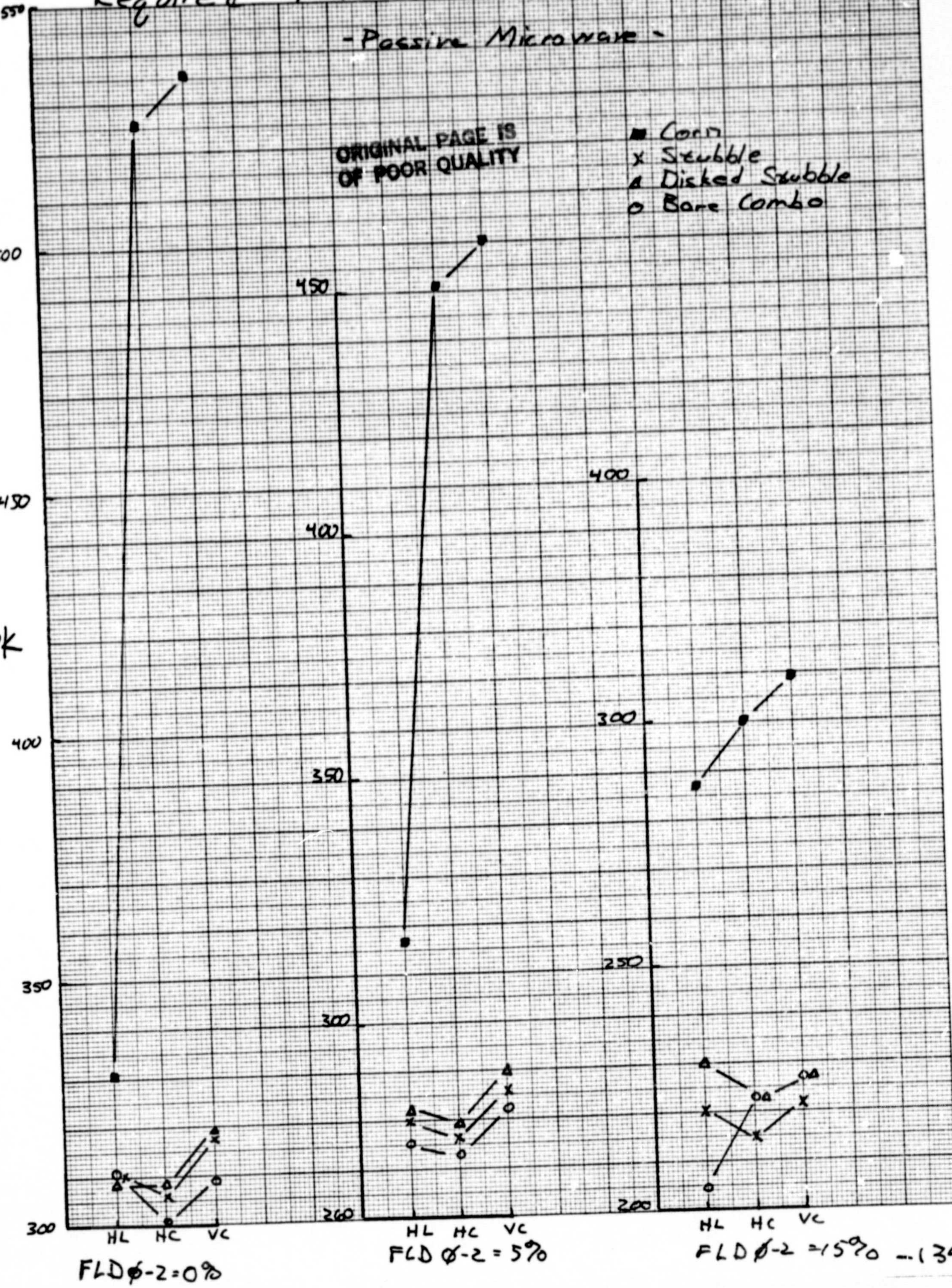


Fig 28

Required T°K to Predict FLD Ø-2



2.14 Stepwise Regressions

An overview of the stepwise regressions is presented parametric in cover types (Figures 29 and 30). These are summarized in the sequence of the variable selected and the combined correlation coefficient. The various steps reflect the maximum correlation coefficients successively as highest correlating sets of variables were determined. The regressions were determined primarily for the SM02 (Guymon) and FLD 02 . (Dalhart) as the dependent variables. The highest correlating sensor channels for each sensor type were used as the source of independent variables.

The microwave radiometer (HC in Guymon; HL in Dalhart) consistently appears in the stepwise regressions for all cover types. Similarly evident are the 13.3 Ghz VV and 1.6 Ghz HV sensors. Note that the greatest step increases of correlation for added sensors occurs for the Guymon milo parallel (but not perpendicular) data and the Dalhart stubble data.

Fig 29A Stepwise Bare SM Ø-2

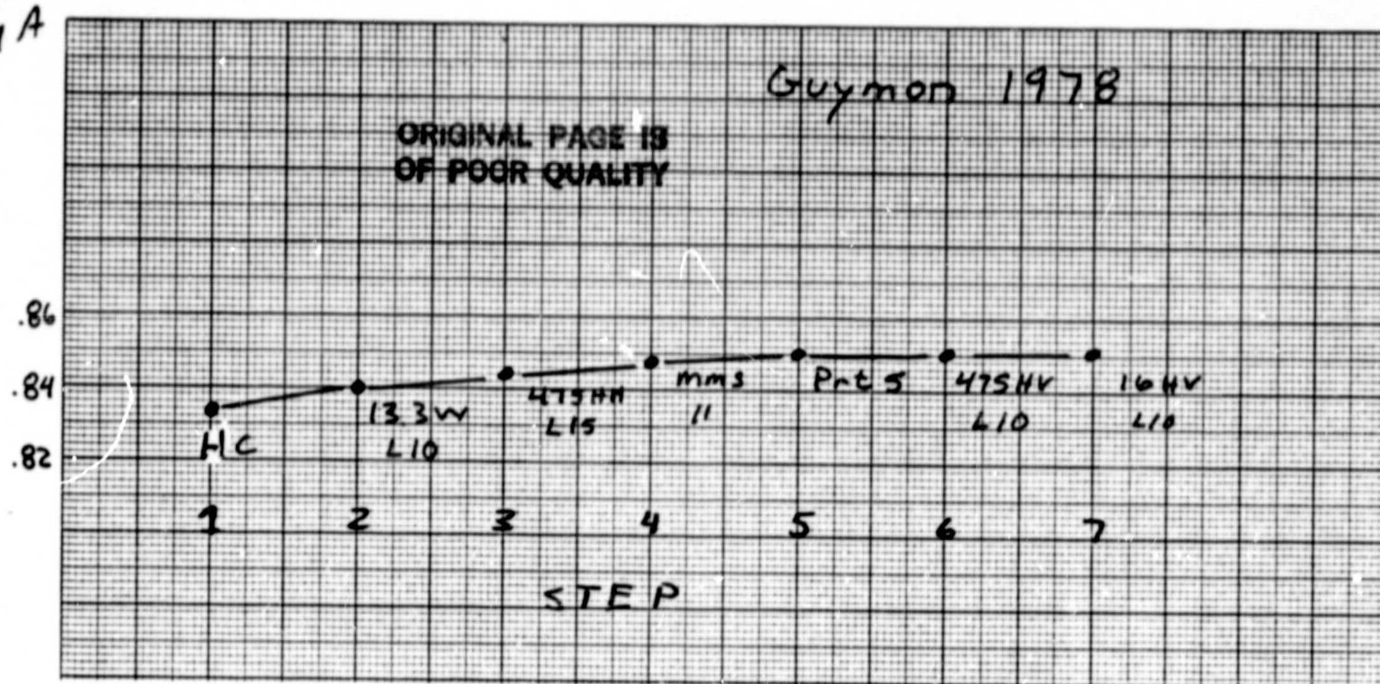


Fig 29B Milo Perpendicular SM Ø-2 Stepwise

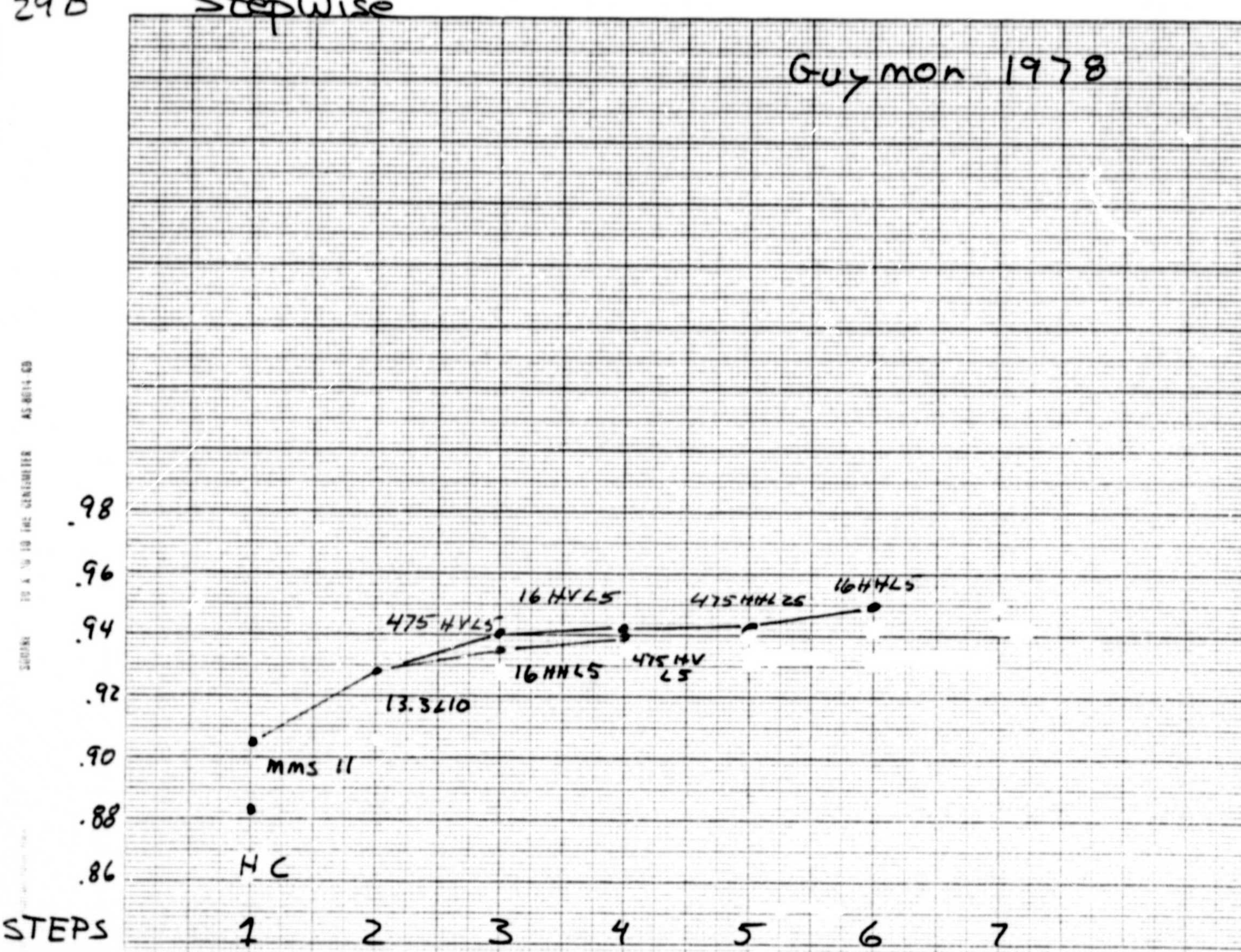


Fig 29C

Milo Parallel SM Ø-2 Stepwise

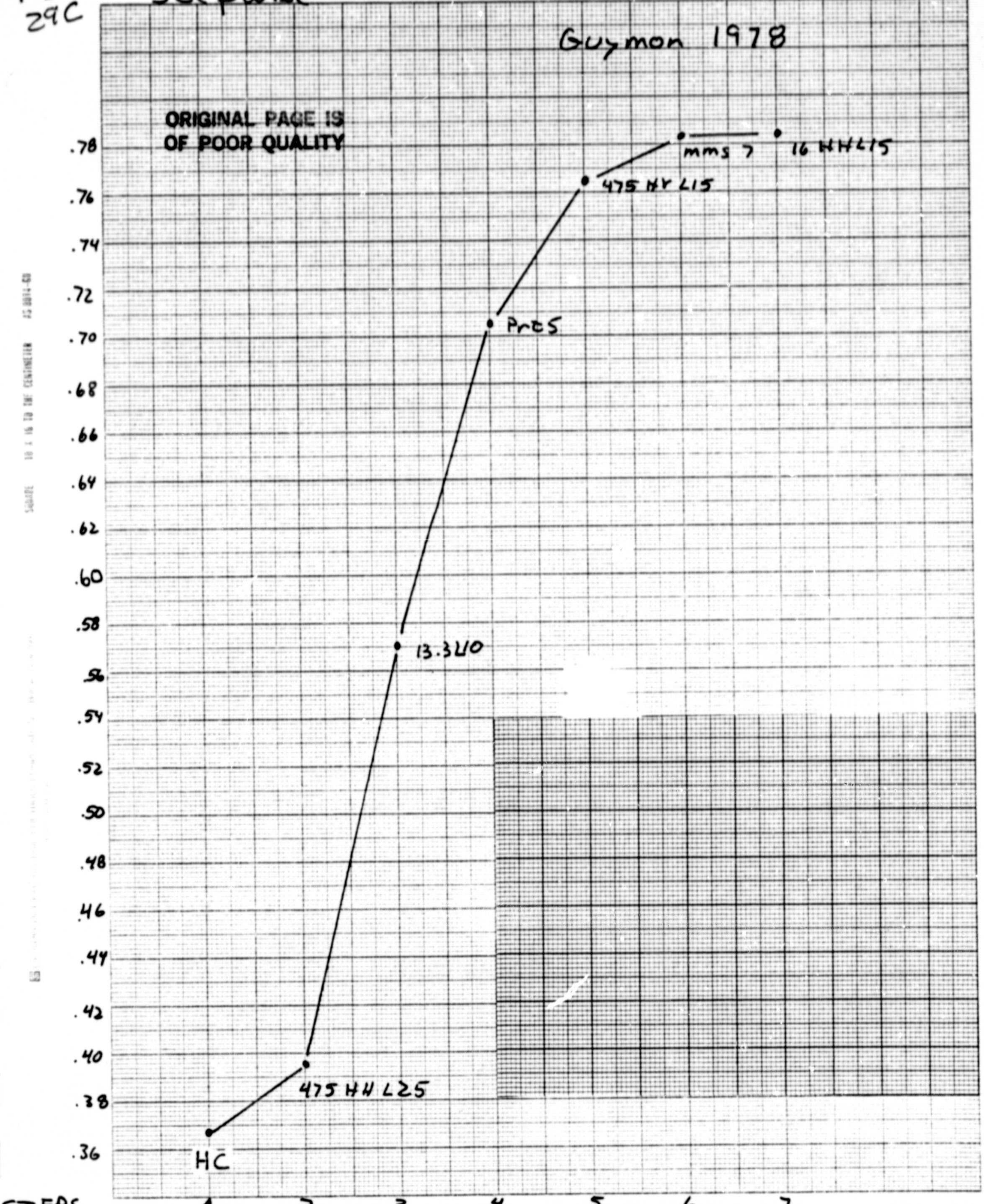
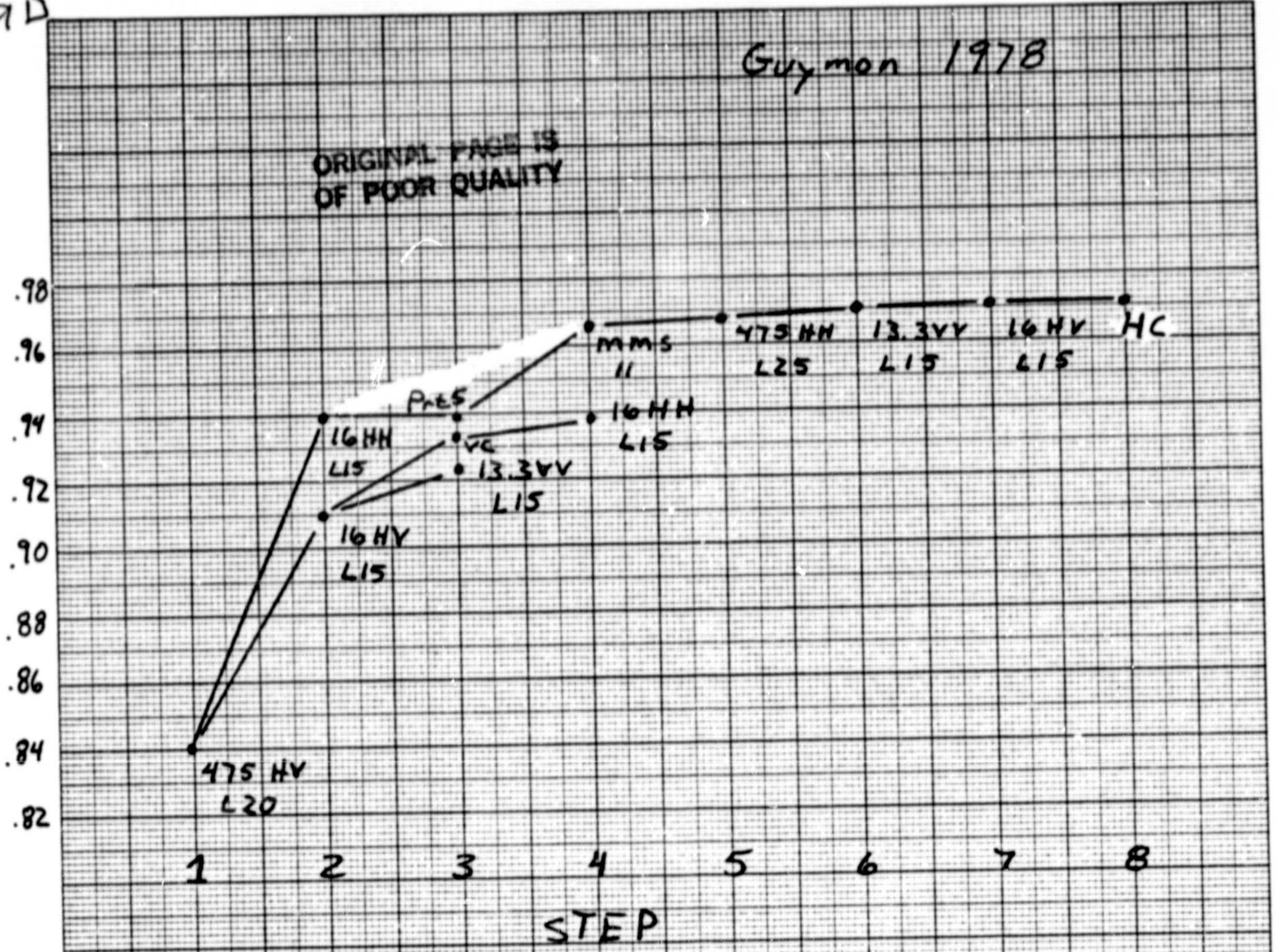


Fig 29D Stepwise Alfalfa SM Ø-2



Stepwise Bare-Combo FLD Ø-2

Fig 30A

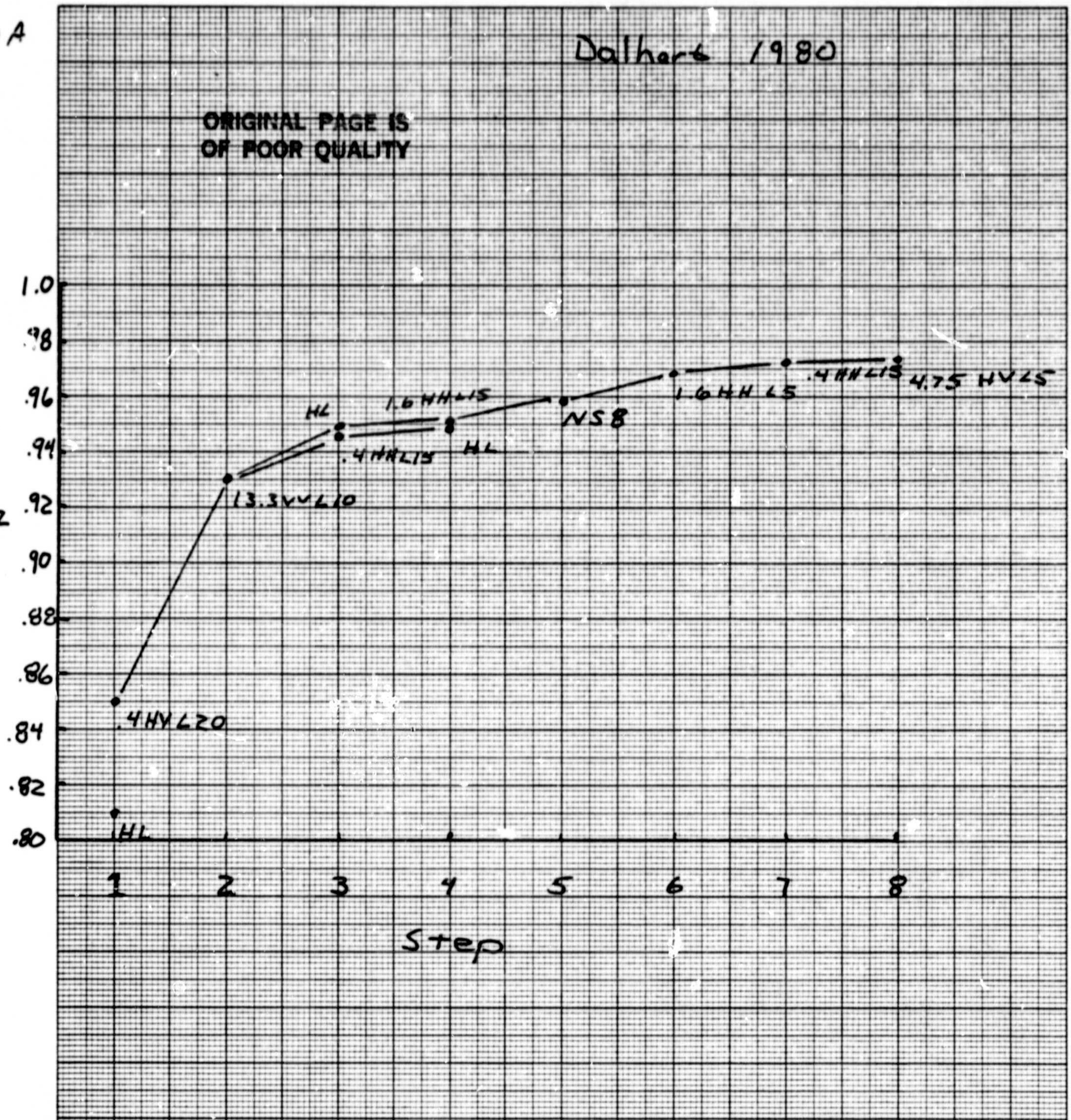


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Fig 30 B Stepwise Combined Stubble FLD Ø-2

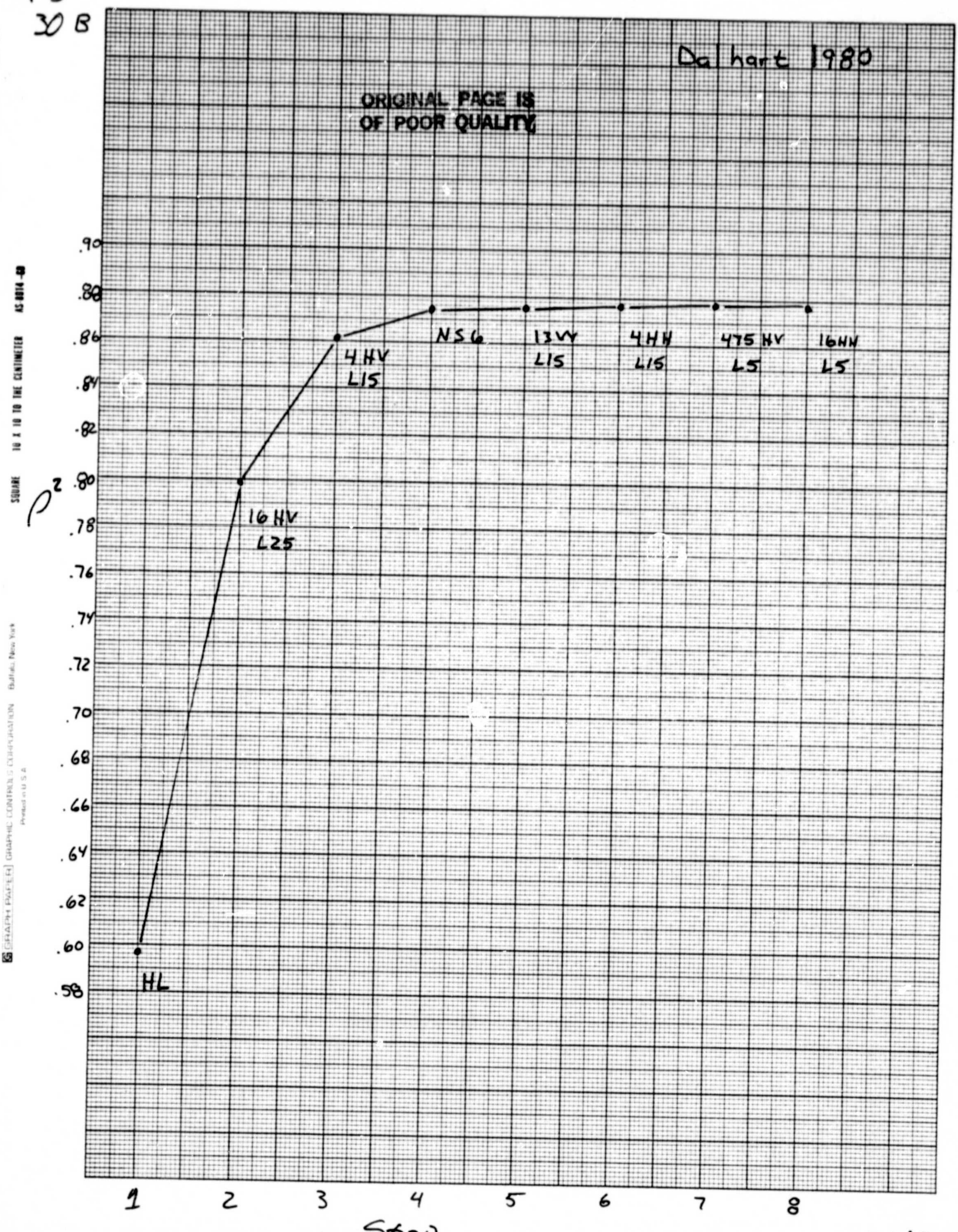

Fig 30C

Stepwise Disked Stubble FLD Ø-2

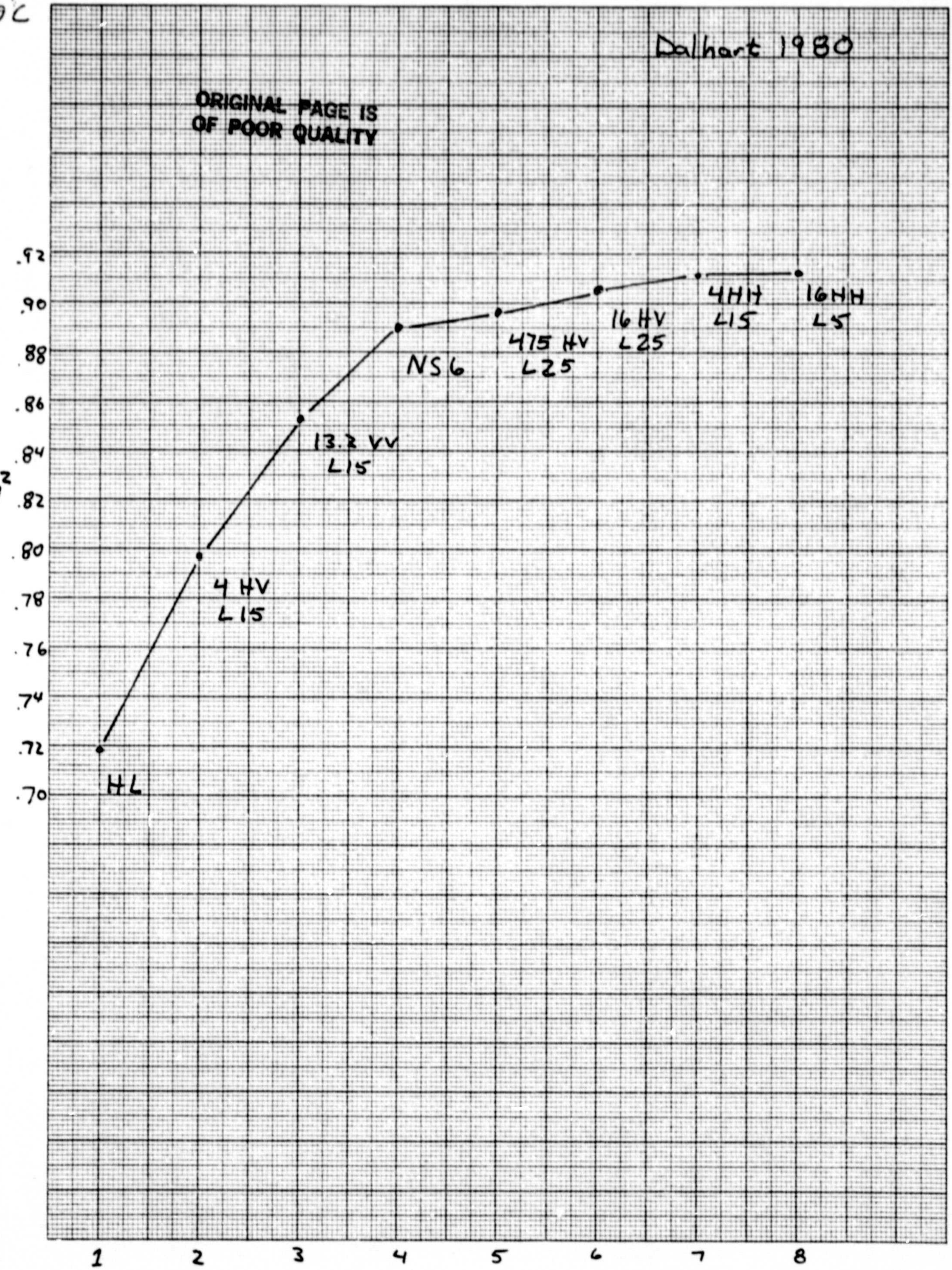

Fig 30 D Stepwise Corn FLD Ø-2

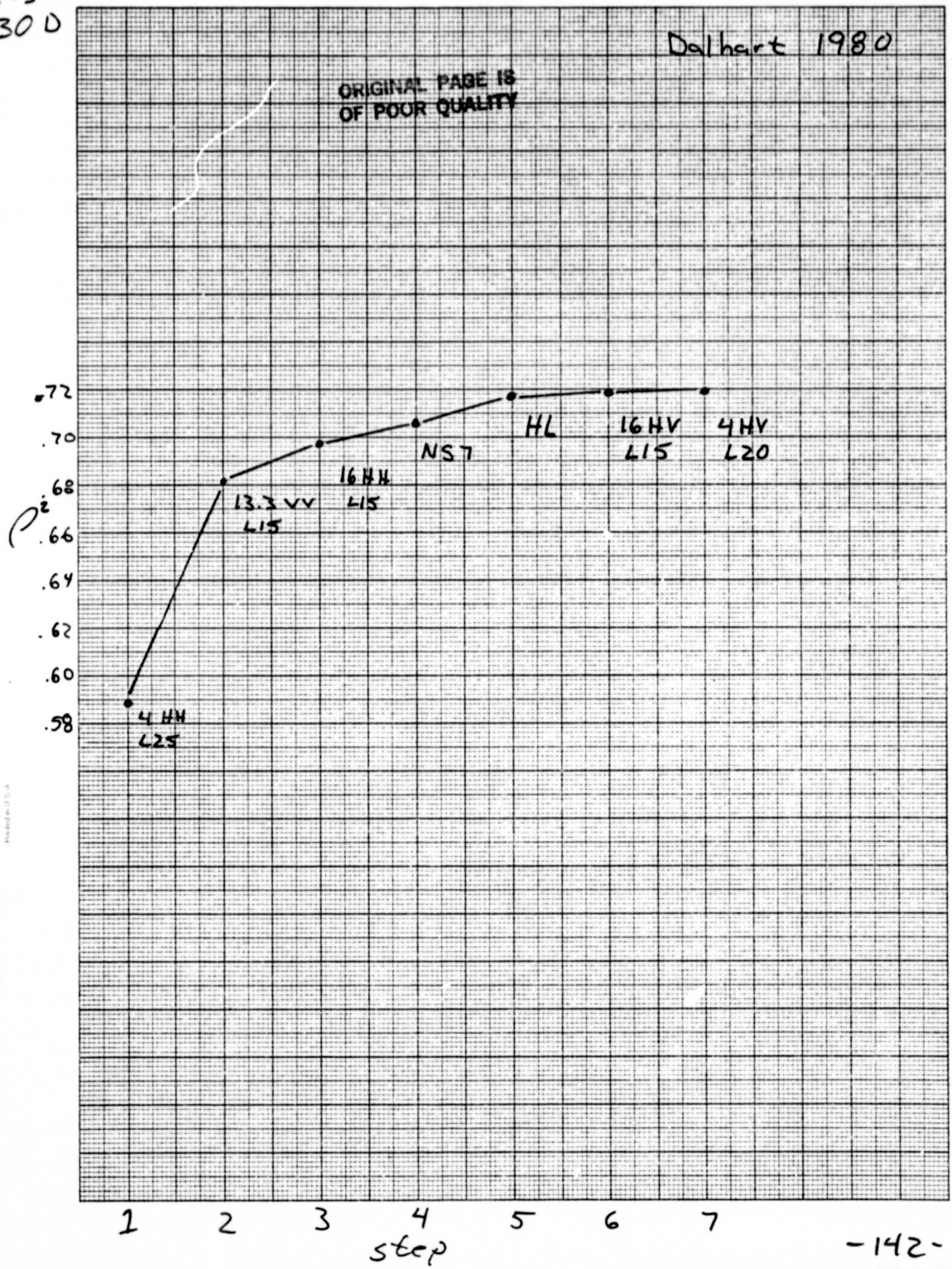

Table 5

Elementary Statistics: Guymon - Bare

STATISTICAL ANAL

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VARIABLE	N	MEAN	STD DEV
B13L5	97	2.26391753	3.89072577
B13L10	95	-0.45578947	3.00055725
B13L15	97	-4.29587629	2.27032108
B13L20	97	-7.49484536	2.00843903
B13L25	97	-6.94020619	1.96472325
B13L35	94	-11.01702128	1.95303119
B13L40	83	-12.06746988	1.91362945
B13L45	74	-12.32567568	1.88520271
B16HHL5	49	-4.67755102	3.49507185
B16HHL10	49	-8.65918367	3.12875896
B16HHL15	49	-11.49591837	3.02936731
B16HHL20	49	-12.69591837	3.35043276
B16HHL25	49	-14.72857143	3.53629986
B16HHL35	46	-17.80869565	4.15830233
B16HHL40	38	-19.50000000	3.62454098
B16HHL45	35	-21.79428571	3.01593248
B16HVL5	49	-18.82653061	1.47546257
B16HVL10	49	-21.04489796	1.45903239
B16HVL15	49	-22.39387755	2.20325594
B16HVL20	49	-22.49387755	2.32400590
B16HVL25	49	-23.83061224	2.87026451
B16HVL35	46	-26.15217391	3.05146516
B16HVL40	38	-26.92105263	3.13956081
B16HVL45	35	-27.88285714	2.77090829
B4HHL5	97	-12.88969072	2.41680249
B4HHL10	97	-15.92989691	2.46674401
B4HHL15	97	-19.55979381	2.45775388

Table 5 (cont'd)

Guymon-Bare

STATISTICAL ANAL

VARIABLE	N	MEAN	STD DEV
B4HHL20	97	-20.85567010	5.16391666
B4HHL25	97	-23.51237113	3.14736192
B4HHL35	94	-31.51914894	2.88892124
B4HHL40	83	-31.49638554	3.30500160
B4HHL45	76	-31.15921053	4.47354230
B4HVL5	97	-25.20000000	2.47718759
B4HVL10	97	-28.40824742	2.50219363
B4HVL15	97	-33.67010309	2.05295341
B4HVL20	97	-36.01649485	3.95252241
B4HVL25	97	-40.33505155	3.32431200
B4HVL35	94	-47.60957447	3.04609989
B4HVL40	83	-46.84216867	2.85341560
B4HVL45	76	-46.07105263	3.63456795
B75HHL5	38	6.60578947	2.32030710
B75HHL10	38	1.62789474	2.23818116
B75HHL15	38	-3.14789474	2.00594543
B75HHL20	38	-6.42131579	1.89023832
B75HHL25	38	-8.10605263	2.23879135
B75HHL35	36	-11.58444444	2.85917015
B75HHL40	32	-13.03250000	2.68541341
B75HHL45	27	-14.67222222	2.46980431
B75HVL5	38	-4.67763158	1.31262772
B75HVL10	38	-9.35078947	1.00482991
B75HVL15	38	-15.64657895	1.33195300
B75HVL20	38	-17.94947368	1.92753441
B75HVL25	38	-20.01657895	2.16423668
B75HVL35	36	-24.03333333	2.50279843
B75HVL40	32	-24.00437500	2.81980203

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Table 5(con't)

Gymon - Bare

VARIABLE	N	MEAN	STD DEV
B75HVL45	27	-26.64888889	2.38549194
BMMS4	50	0.89680000	0.48212303
BMMS7	50	1.02240000	0.54048942
BMMS8	50	1.11940000	0.56257575
BMMS9	50	2.40180000	1.18506297
BMMS11	108	28.10981481	6.48530344
BHL	51	266.00392157	19.41664194
BVC	54	273.99814815	18.54157481
BHC	54	278.59814815	18.81073049
BFLD02	96	6.43750000	4.57455779
BFLD25	96	7.83645833	4.55155543
BSM02	98	6.30816327	4.48669680
BSM25	98	7.54591837	4.50113773
BSM59	98	9.87346939	4.15043287
BSM915	98	16.53061224	3.84328060
BSM015	98	12.50408163	3.47544904
BSM1530	98	23.93469388	3.97790553
BSM3045	98	25.08775510	4.75627129
BPRT5	108	27.69259259	6.33701046

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Table 6 Correlation of Sensors Vs Soil Moisture

Guymon Bare

	SM ∅ 2	2 5	5 9	9 15	∅ 15	15 3∅	3∅ 45	FLD ∅ 2	2 5
VV 13.3∠5	.45	.54	.59	.37	.49	-.07	-.28	.50	.55
VV 13.3∠10	.56	.63	.67	.34	.60	-.13	.35	.64	.67
VV 13.3∠45	.01	-.24	-.31	-.02	-.05	.41	.52	.08	-.18
HH 1.6∠15	.37	.21	.14	.07	.36	.03	-.09	.51	.31
HH 1.6∠40	.08	-.07	-.15	-.12	.08	.16	.19	.17	.01
HV 1.6∠10	.52	.39	.22	.07	.32	.01	-.04	.59	.47
HV 1.6∠25	.52	.28	.07	0.0	.36	.17	.16	.57	.37
HV 1.6∠40	.45	.22	.02	-.04	.32	.17	.17	.58	.40
HV 1.6∠45	.41	.10	-.22	-.25	.13	.14	.19	.54	.32
HH .4∠5	.19	.29	.32	.05	.30	-.25	-.31	.21	.30
HH .4∠15	-.23	-.17	-.02	-.05	-.16	-.23	-.27	-.21	-.17
HH .4∠40	-.48	-.47	-.36	-.14	-.32	.06	.12	-.48	-.47
HH .4∠45	-.45	-.50	-.47	-.26	-.36	.07	.20	-.41	-.46
HV .4∠15	.18	.32	.41	.22	.26	-.21	-.30	.22	.31
HV .4∠45	-.23	-.26	-.27	-.15	-.11	.07	.16	-.12	-.16
HH 4.75∠5	.51	.54	.64	.40	.57	-.28	-.52	.48	.50
HH 4.75∠15	.54	.46	.49	.35	.61	-.01	-.21	.58	.47
HH 4.75∠45	.34	.06	-.08	.03	.25	.39	.36	.48	.18
HV 4.75∠10	.69	.54	.35	.23	.44	.15	.07	.68	.57
HV 4.75∠35	.38	.14	-.03	.07	.26	.50	.53	.45	.23
MMS M	-.46	-.38	-.22	-.07	-.30	-.08	-.16	-.51	-.42
MFMR HC	-.80	-.74	-.61	-.25	-.64	.13	.31	-.87	-.80
Prt 5	-.46	-.38	-.22	-.01	-.28	.13	.18	-.50	-.41

Table 7

Single Variable Regressions for SMØ-2
Guymon Bare

Independent Variable	Intercept	Coefficient	R^2	S.E.E.
13.3VV L10	7.25	.947	.31	
1.6HH L15	13.89	.624	.138	
1.6HV L10	41.33	1.65	.272	
.4HH L25	-6.94	-.57	.156	
.4HV L15	20.87	.429	.033	
4.75HH L15	11.2	1.42	.292	
4.75HV L10	37.39	3.30	.478	
MMS 4	7.49	-1.20	.014	
MMS 7	7.20	-.789	.007	
MMS 8	7.18	-.718	.0069	
MMS 9	7.11	-.30	.005	
MMS 11	15.67	-.32	.207	
MFMR HL	65.95	-.22	.567	
MFMR HC	71.51	-.235	.632	
MFMR VC	71.75	-.23	.628	
Prt 5	16.00	-.339	.207	

Table 8 Elementary Statistics: Guymon - Milo Perp

VARIABLE	N	MEAN	STD DEV
R13L5	67	4.93283582	3.53109083
R13L10	61	3.70491803	3.26161648
R13L15	65	0.06615385	2.33407349
R13L20	67	-2.74029851	1.59896365
R13L25	66	-2.01666667	1.47893760
R13L35	65	-6.38307692	1.26769590
R13L40	60	-7.46666667	1.13535878
R13L45	55	-8.06363636	1.43105292
R16HHL5	32	0.33750000	4.23051511
R16HHL10	32	-0.44375000	3.93830957
R16HHL15	32	-1.35000000	3.45085310
R16HHL20	32	-2.56875000	4.33473871
R16HHL25	31	-5.11612903	3.88776686
R16HHL35	30	-7.31333333	3.08486107
R16HHL40	28	-10.24285714	2.32130688
R16HHL45	27	-13.45185185	3.40456372
R16HVL5	32	-16.58750000	1.82115702
R16HVL10	32	-16.97500000	2.03565001
R16HVL15	32	-15.67187500	2.41062626
R16HVL20	32	-15.38750000	2.61580186
R16HVL25	32	-15.75312500	2.61533744
R16HVL35	30	-17.36666667	1.99954018
R16HVL40	28	-18.63214286	1.98215251
R16HVL45	27	-19.65555556	1.92899602
R4HHL5	67	-12.98208955	3.32415063
R4HHL10	67	-14.63134328	3.48843149
R4HHL15	67	-12.72985075	5.01748503

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Table 3 (con't)

Guymon-Milo Perp.

STATISTICAL ANAL

VARIABLE	N	MEAN	STD DEV
R4HHL20	67	-8.34029851	7.44460471
R4HHL25	67	-18.49104478	3.07820940
R4HHL35	65	-26.81846154	2.72791658
R4HHL40	61	-26.76065574	2.28832389
R4HHL45	57	-22.19824561	3.08998909
R4HVL5	67	-25.65074627	3.25713078
R4HVL10	67	-28.09253731	3.25074879
R4HVL15	67	-29.33134328	4.16115547
R4HVL20	67	-24.38656716	5.98128129
R4HVL25	67	-33.63134328	3.09639130
R4HVL35	65	-39.81384615	3.06149866
R4HVL40	61	-38.57049180	2.97827379
R4HVL45	56	-33.75892857	3.34646499
R75HHL5	23	8.56260870	2.86077742
R75HHL10	23	5.67652174	3.74188529
R75HHL15	23	2.33304348	3.38160322
R75HHL20	23	-0.07913043	3.27793299
R75HHL25	23	-1.23565217	3.46373921
R75HHL35	23	-5.86260870	2.69416578
R75HHL40	22	-7.44681818	2.20552636
R75HHL45	18	-9.28055556	1.68155206
R75HVL5	23	-3.69739130	1.48790034
R75HVL10	23	-6.65434783	1.98071343
R75HVL15	23	-11.17043478	1.91790956
R75HVL20	23	-12.24913043	2.03265593
R75HVL25	23	-13.49086957	1.85286734
R75HVL35	23	-16.88434783	1.72983401
R75HVL40	22	-16.84681818	1.94517568

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Table 3 (con't)

Gymon - Milo Perp.

STATISTICAL ANAL

VARIABLE	N	MEAN	STD DEV
R75HVL45	18	-19.45000000	1.60991048
RMMS4	36	0.53638889	0.22809964
RMMS7	36	1.06750000	2.23143308
RMMS8	36	1.02944444	0.41787862
RMMS9	36	4.20666667	1.77369509
RMMS11	72	24.41694444	3.65256061
RHL	36	260.71666667	14.32999850
RVC	36	270.60555556	11.76323436
RHC	36	275.94444444	11.82862012
RFLD02	58	18.20344828	7.85975683
RFLD25	58	20.81379310	5.76539733
RSM02	58	18.07931034	8.08216053
RSM25	58	20.88275862	6.28172336
RSM59	58	24.61379310	5.20095970
RSM915	58	29.11379310	5.02374880
RSM015	58	25.13448276	4.99029063
RSM1530	58	29.19310345	3.22669034
RSM3045	58	29.36551724	2.50098589
RPRT5	72	23.44722222	3.55785076

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Table 9

Guymon Milperp

	SM ∅ 2	2 5	5 9	9 15	∅ 15	15 30	30 45	FLD ∅ 2	2 5
VV 13.3L10	.70	.58	.57	.57	.49	.23	.18	.76	.64
VV 13.3L15	.65	.58	.52	.49	.44	.22	.22	.67	.62
VV 13.3L25	.49	.55	.48	.37	.37	.23	.25	.44	.54
HH 1.6L5	.71	.68	.61	.51	.51	.28	.28	.70	.69
HH 1.6L10	.70	.58	.56	.52	.50	.28	.24	.71	.58
HH 1.6L25	.61	.61	.54	.41	.46	.30	.32	.63	.64
HH 1.6L35	.37	.50	.41	.20	.39	.24	.35	.29	.45
HV 1.6L5	.78	.72	.70	.72	.64	.48	.43	.70	.68
HV 1.6L20	.78	.68	.66	.71	.63	.49	.44	.74	.67
HV 1.6L25	.77	.69	.70	.73	.70	.57	.55	.73	.67
HV 1.6L40	.68	.58	.62	.67	.64	.54	.56	.59	.53
HH .4L20	-.45	-.30	-.30	-.46	-.27	-.15	-.10	-.52	-.38
HH .4L25	-.12	.06	.02	-.15	-.09	-.17	-.15	-.13	.03
HV .4L20	-.46	-.39	-.34	-.41	-.30	-.16	-.14	-.54	-.48
HV .4L25	-.35	-.31	-.24	-.26	-.31	-.30	-.34	-.40	-.39
HH 4.75L25	.65	.72	.64	.63	.62	.48	.57	.57	.64
HH 4.75L45	.68	.81	.75	.57	.66	.54	.61	.63	.78
HV 4.75L5	.68	.65	.61	.62	.54	.37	.31	.64	.62
HV 4.75L25	.61	.61	.57	.56	.50	.33	.36	.55	.57
MMS 11	-.57	-.50	-.46	-.45	-.52	-.43	-.44	-.61	-.58
MFMR HL	-.90	-.82	-.79	-.75	-.78	-.64	-.65	-.89	-.83
MFMR VC	-.84	-.75	-.70	-.65	-.66	-.43	-.40	-.84	-.80
MFMR HC	-.85	-.78	-.72	-.66	-.68	-.45	-.42	-.85	-.81
PrL 5	-.62	-.55	-.50	-.49	-.56	-.49	-.51	-.65	-.61

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Table 10

Single Variable Regressions for SM Ø-2
Guymon - Milo perpendicular

Independent Variable	Intercept	Coefficient	R^2	S.E.E.
13.3VVL10	12.37	1.72	.488	
1.6HHL5	19.11	1.40	.508	
1.6HVL5	73.57	3.31	.60	
.4HHL20	14.08	-.51	.206	
.4HVL20	3.53	-.62	.214	
4.75HHL25	19.43	1.98	.419	
4.75HVL5	31.49	3.62	.463	
MMS 4	21.13	-5.47	.025	
MMS 7	17.31	.76	.04	
MMS 8	20.79	-2.55	.02	
MMS 9	20.79	-.619	.02	
MMS 11	49.35	-1.26	.358	
MFMR HL	184.44	-.62	.80	
MFMR HC	184.70	-.61	.73	
MFMR VC	186.33	-.60	.71	
Prt 5	50.69	-1.37	.385	

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Table 11

Elementary Statistics: Guymon - Milo Par.*

*note: Prefix "R" should be "[illegible]"

VARIABLE	N	MEAN	STD DEV
R13L5	64	1.05625000	1.89249772
R13L10	63	-1.11111111	1.41559415
R13L15	64	-4.35625000	1.48322632
R13L20	64	-6.88750000	1.47071951
R13L25	64	-6.01250000	1.59279130
R13L35	64	-9.60156250	1.73346998
R13L40	58	-10.31724138	1.78984836
R13L45	51	-10.29215686	1.75258017
R16HHL5	33	-8.26666667	3.59014856
R16HHL10	33	-11.55454545	2.68910893
R16HHL15	33	-13.67878788	2.23323722
R16HHL20	33	-14.63939394	2.44539611
R16HHL25	33	-16.16060606	2.83658459
R16HHL35	33	-18.43030303	3.02443020
R16HHL40	28	-19.42142857	2.92566639
R16HHL45	25	-20.11200000	2.78288220
R16HVL5	33	-18.07575758	1.32004505
R16HVL10	33	-19.72727273	1.73372300
R16HVL15	33	-20.30303030	2.59271634
R16HVL20	33	-19.94848485	3.14007576
R16HVL25	33	-20.28484848	3.47240202
R16HVL35	33	-21.53636364	3.68415680
R16HVI40	28	-22.19642857	3.27770043
R16HVL[illegible]	25	-22.47600000	2.65867762
R4HHL5	64	-14.92812500	2.78644501
R4HHL10	64	-19.21562500	2.62268605
R4HHL15	64	-21.93125000	2.29145237

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Table 1 (Co..)

Guymon - Milo Par.

VARIABLE	N	MEAN	STD DEV
R4HHL20	64	-23.27812500	3.25437282
R4HHL25	64	-26.19843750	2.66240685
R4HHL35	64	-31.75625000	2.39754339
R4HHL40	58	-32.00172414	2.03163502
R4HHL45	51	-32.33333333	2.24505382
R4HVL5	64	-26.28437500	1.94921382
R4HVL10	64	-29.44687500	2.55417298
R4HVL15	64	-32.28125000	2.01146515
R4HVL20	64	-33.14531250	2.81119811
R4HVL25	64	-35.84375000	3.48979806
R4HVL35	64	-39.28281250	4.58778761
R4HVL40	58	-38.95862069	4.47609771
R4HVL45	51	-38.35882353	4.62186873
R75HHL5	26	4.49692308	1.77610759
R75HHL10	26	-0.04576923	1.94015499
R75HHL15	26	-4.11115385	1.67957215
R75HHL20	26	-6.77230769	1.83014821
R75HHL25	26	-8.00076923	1.86171302
R75HHL35	24	-10.22625000	2.02674469
R75HHL40	24	-11.12875000	2.06425755
R75HHL45	20	-12.55400000	2.13908342
R75HVL5	26	-4.31730769	1.33050835
R75HVL10	26	-8.18192308	1.37090341
R75HVL15	26	-13.18807692	2.11600382
R75HVL20	26	-14.31692308	2.58109243
R75HVL25	26	-15.89653846	2.89154207
R75HVL35	24	-18.90625000	2.59868665
R75HVL40	24	-18.81833333	2.48688502

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STATISTICAL ANAL

Table 11 (con't) Gizmon - Milo Par.

VARIABLE	N	MEAN	STD DEV
R75HVL45	20	-20.91100000	2.45448011
RMMS4	31	0.73967742	0.37178384
RMMS7	31	0.67645161	0.37617858
RMMS8	31	1.12935484	0.48288671
RMMS9	31	3.37516129	1.29916350
RMMS11	70	25.46085714	4.40484672
RHL	35	270.34285714	12.90862196
RVC	36	274.18055556	12.47561781
RHC	36	277.41944444	13.07127318
RFLD02	70	9.69428571	6.57945607
RFLD25	70	12.83142857	5.99423740
RSM02	72	9.70555556	6.57007490
RSM25	72	12.92083333	6.34534181
RSM59	72	16.68333333	6.39830523
RSM915	72	21.19583333	6.26698116
RSM015	72	17.66250000	5.63718633
RSM1530	72	23.18750000	4.69716539
RSM3045	72	23.93194444	3.94268181
RPRT5	72	24.91527778	4.17263587

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Table 12

Guymon Milopar

	SM ∅ 2	2 5	5 9	9 15	∅ 15	15 3∅	3∅ 45	FLD ∅ 2	2 5
VV 13.3∠10	.42	.45	.43	.35	.43	.21	.25	.43	.49
VV 13.3∠40	.10	.01	.09	.35	.21	.46	.38	.13	.05
VV 13.3∠20	.22	.11	.15	.35	.27	.44	.36	.25	.16
HH 1.6∠15	.54	.52	.52	.48	.57	.40	.47	.56	.57
HH 1.6∠20	.51	.41	.42	.52	.53	.54	.56	.52	.45
HH 1.6∠25	.48	.34	.36	.53	.50	.58	.58	.48	.37
HV 1.6∠45	.47	.26	.22	.41	.40	.59	.47	.48	.31
HH .4∠35	-.19	-.05	.03	-.03	-.03	-.08	-.03	-.22	-.10
HH .4∠45	-.18	-.16	-.07	.01	-.05	.06	.05	-.21	-.21
HV .4∠15	-.05	0.0	.05	-.10	.03	-.16	-.09	-.03	.02
HV .4∠20	-.19	-.20	-.13	-.13	-.10	-.09	-.08	-.13	-.19
HV .4∠45	-.10	-.23	-.18	.02	-.06	.26	.16	-.09	-.24
HH 4.75∠15	.24	.33	.30	.05	.21	-.16	-.07	.23	.33
HH 4.75∠25	.39	.25	.27	.48	.42	.56	.49	.39	.27
HH 4.75∠45	.50	.38	.37	.57	.52	.70	.59	.52	.41
HV 4.75∠15	.38	.26	.23	.36	.35	.36	.30	.38	.29
HV 4.75∠45	.52	.41	.40	.58	.53	.68	.56	.53	.43
MMS 7	.27	.39	.36	.11	.27	-.08	0.0	.22	.33
MMS 11	-.09	.01	.08	.08	.07	.05	.05	-.15	-.09
MFMR HL	-.56	-.56	-.43	-.24	-.38	-.08	-.13	-.59	-.62
MFMR HC	-.48	-.50	-.37	-.15	-.32	-.03	-.03	-.49	-.54
Prt 5	-.26	-.16	-.10	-.14	-.14	-.16	-.16	-.30	-.23

Table 13

Single Variable Regressions for SMØ-2
Guymon - Milo parallel

Independent Variable	Intercept	Coefficient	R^2	S.E.E.
13.3VVL10	11.84	2.029	.178	
1.6HHL15	32.70	1.679	.296	
1.6HVL15	33.00	1.14	.186	
.4HHL10	3.35	-.32	.01	
.4HVL20	-5.47	-.45	.03	
4.75HHL25	21.93	1.52	.149	
4.75HVL15	26.92	1.30	.141	
MMS 4	5.99	3.55	.05	
MMS 7	5.85	4.08	.07	
MMS 8	6.03	2.28	.03	
MMS 9	8.61	.002	0	
MMS 11	18.70	-.347	.05	
MFMR HL	85.45	-.28	.31	
MFMR HC	79.48	-.25	.23	
MFMR VC	76.10	-.239	.22	
Prt 5	19.78	-.40	.06	

Table 14

Elementary Statistics: Guymon - Alfalfa

VARIABLE	N	MEAN	STD DEV
A13L5	40	2.54750000	3.09764075
A13L10	39	-1.43589744	1.86568559
A13L15	40	-5.31000000	1.44147360
A13L20	40	-8.22250000	1.25483424
A13L25	40	-7.44000000	1.11166311
A13L35	38	-10.80000000	1.10085961
A13L40	36	-11.26111111	1.23248362
A13L45	31	-11.02258065	1.51936603
A16HHL5	20	-1.64500000	4.66910056
A16HHL10	21	-8.99047619	3.03659427
A16HHL15	21	-12.38571429	2.94385559
A16HHL20	21	-14.33809524	2.94914838
A16HHL25	21	-16.50952381	2.69534873
A16HHL35	19	-19.00000000	2.88925211
A16HHL40	17	-21.04705882	2.72972472
A16HHL45	16	-22.53750000	2.62827573
A16HVL5	21	-17.23809524	1.86533541
A16HVL10	21	-20.33333333	1.95661272
A16HVL15	21	-21.97142857	2.50841441
A16HVL20	21	-21.64285714	2.55667194
A16HVL25	21	-23.47142857	2.81818077
A16HVL35	19	-24.93157895	2.73273421
A16HVL40	17	-26.45882353	2.83770568
A16HVL45	16	-27.32500000	2.75426941
A4HHL5	40	-8.03500000	5.45957404
A4HHL10	40	-15.87500000	2.75613535
A4HHL15	40	-20.52000000	2.38157457

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Table 14 (con't)

Guymon - Alfalfa

S T A T I S T I C A L   A N A L

VARIABLE	N	MEAN	STD DEV
A4HHL20	40	-23.77500000	3.18044909
A4HHL25	40	-26.00000000	4.29239040
A4HHL35	38	-33.08947368	3.43289252
A4HHL40	36	-33.11666667	3.44437430
A4HHL45	35	-33.56285714	3.14821011
A4HVL5	40	-20.59000000	3.54768252
A4HVL10	40	-25.48500000	2.05732587
A4HVL15	40	-30.85000000	3.02171627
A4HVL20	40	-34.26500000	3.46073580
A4HVL25	40	-39.11500000	4.25269447
A4HVL35	38	-45.82368421	3.02077797
A4HVL40	36	-45.38333333	3.53331087
A4HVL45	35	-45.00285714	3.16120656
A75HHL5	17	7.56941176	2.25415858
A75HHL10	16	1.05812500	1.66138183
A75HHL15	17	-3.55000000	1.81000691
A75HHL20	17	-6.58000000	1.88034239
A75HHL25	17	-7.89235294	2.15008584
A75HHL35	15	-10.97200000	2.57359448
A75HHL40	15	-12.41800000	2.20269705
A75HHL45	13	-13.86769231	2.25908593
A75HVL5	17	-4.00411765	0.88684172
A75HVL10	17	-7.62352941	1.00209743
A75HVL15	17	-13.13882353	1.35285754
A75HVL20	17	-14.95117647	1.59970654
A75HVL25	17	-16.57941176	1.81486043
A75HVL35	15	-19.69333333	2.14307078
A75HVL40	15	-19.78600000	2.35266354

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Table 4 (cont.)

Guymon - Alfalfa STATISTICAL ANAL

VARIABLE	N	MEAN	STD DEV
A75HVL45	13	-22.04615385	1.74967873
AMMS4	24	0.55666667	0.21997365
AMMS7	24	1.02125000	2.15448433
AMMS8	24	1.26125000	0.50428005
AMMS9	24	4.60541667	1.95066762
AMMS11	48	23.63708333	3.50138633
AHL	23	250.95652174	12.56068274
AVC	24	271.85000000	10.77238821
AHC	24	276.56250000	11.02080296
AFLD02	44	17.41818182	6.21046651
AFLD25	44	20.82727273	5.05662649
ASM02	44	16.99090909	6.65700604
ASM25	44	20.28863636	5.61700971
ASM59	44	21.27500000	4.95463725
ASM915	44	20.60227273	4.24338000
ASM015	44	20.18636364	4.72955039
ASM1530	44	21.11136364	3.03362673
ASM3045	44	19.11590909	2.24964526
APRT5	48	22.76041667	3.49533060

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Table 15

Guymon Alfalfa

	SM Ø 2	2 5	5 9	9 15	Ø 15	15 3Ø	3Ø 45	Ø 2	2 5
VV 13.3 L15	.56	.66	.63	.62	.60	.56	.67	.59	.69
HH 1.6 L5	.25	.46	.42	.42	.34	.59	.74	.23	.44
HH 1.6 L15	.70	.73	.71	.71	.70	.46	.34	.64	.69
HH 1.6 L45	.82	.74	.73	.71	.75	.34	.19	.76	.69
HV 1.6 L15	.79	.76	.78	.77	.79	.45	.10	.78	.75
HV 1.6 L45	.87	.82	.82	.81	.83	.53	.29	.83	.80
HH .4 L25	.15	.22	.19	.20	.22	.15	-.03	.16	.22
HH .4 L45	.07	.20	.15	.16	.14	.35	.41	.01	.15
HV .4 L20	.16	.22	.17	.16	.17	.05	-.06	.10	.15
HV .4 L35	.21	.24	.20	.21	.23	.20	.01	.12	.15
HH 4.75 L25	.81	.79	.76	.76	.79	.60	.37	.79	.76
HH 4.75 L45	.82	.78	.78	.78	.79	.70	.43	.64	.62
HV 4.75 L20	.75	.74	.74	.75	.76	.71	.44	.70	.70
MMS 11	-.58	-.56	-.60	-.63	-.61	-.46	-.36	-.68	-.63
MFMR HC	-.79	-.78	-.82	-.83	-.81	-.65	-.56	.84	.83
Prt S	-.62	-.61	-.64	-.66	-.65	-.55	-.47	-.73	-.70

Table 16 Single Variable Regressions of SM Ø-2

Guymon - Alfalfa

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Independent Variable	Intercept	Coefficient	R^2	S.E.E.
13.3VVL15	31.03	2.60	.31	
1.6 HHL15	36.22	1.54	.48	
1.6HVL15	61.92	2.06	.62	
.4 HHL5	14.26	-.324	.07	
.4HVL5	8.82	-.393	.04	
4.75HHL25	37.30	2.66	.66	
4.75HVL20	65.13	3.28	.567	
MMS 4	21.55	-8.69	.087	
MMS 7	16.11	.611	.04	
MMS 8	19.5	-2.18	.029	
MMS 9	19.00	-.47	.021	
MMS 11	40.99	-1.01	.306	
MFMR HL	129.07	-.44	.51	
MFMR HC	174.22	-.57	.618	
MFMR VC	170.89	-.55	.599	
Prt 5	43.13	-1.14	.38	

Table 17

Correlation Coefficients: SM vs SM

Milpar

	SM Ø 2	2 5	5 9	9 15	15 3Ø	3Ø 45	Ø 15	FLD Ø 2	2 5
SM Ø 2	1.0	.93	.85	.72	.62	.62	.90	.99	.95
2 5		1.0	.95	.78	.60	.65	.93	.89	.97
5 9			1.0	.89	.73	.79	.96	.80	.91
9 15				1.0	.94	.94	.91	.70	.74
15-3Ø					1.0	.97	.81	.59	.57
3Ø 45						1.0	.84	.59	.61
Ø 15							1.0	.88	.92
FLD Ø 2								1.0	.95
2 5									1.0

Bare

	SM Ø 2	2 5	5 9	9 15	15 3Ø	3Ø 45	Ø 15	FLD Ø 2	2 5
SM Ø 2	1.0	.88	.70	.30	-.07	-.18	.75	.86	.85
2 5		1.0	.90	.37	-.17	-.36	.81	.85	.97
5 9			1.0	.54	-.13	-.41	.80	.70	.88
9 15				1.0	.62	-.28	.72	.34	.35
15 3Ø					1.0	.88	.22	.0	-.16
3Ø 45						1.0	-.07	-.13	-.33
Ø 15							1.0	.74	.78
FLD Ø 2								1.0	.90
2 5									1.0

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Table 18

Correlation Coefficients: SM vs SM

milperp

	SM Ø 2	2 5	5 9	9 15	15 3Ø	3Ø 45	Ø 15	FLD Ø 2	2 5
SM Ø 2	1.0	.92	.94	.91	.78	.71	.93	.95	.91
2 5		1.0	.97	.87	.84	.77	.94	.84	.95
5 9			1.0	.93	.87	.79	.97	.87	.93
9 15				1.0	.87	.76	.93	.85	.85
15 3Ø					1.0	.93	.93	.69	.78
3Ø 45						1.0	.87	.62	.72
Ø 15							1.0	.86	.90
FLD Ø-2								1.0	.92
2-5									1.0

Alfalfa

	SM Ø 2	2 5	5 9	9 15	15 3Ø	3Ø 45	Ø 15	FLD Ø 2	2 5
SM Ø 2	1.0	.95	.95	.94	.69	.51	.96	.95	.91
2 5		1.0	.98	.98	.79	.63	.97	.91	.96
5 9			1.0	.99	.82	.64	.98	.91	.95
9 15				1.0	.83	.64	.98	.92	.96
15 3Ø					1.0	.85	.80	.64	.75
3Ø 45						1.0	.59	.43	.56
Ø 15							1.0	.93	.95
FLD Ø 2								1.0	.95
2 5									1.0

Table 19 Elementary Statistics: Dalhart-Bare Combo

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VARIABLE	N	MEAN	STD DEV
Z13VVL5	18	0.86944444	1.52416022
Z13VVL10	18	-1.28500000	1.10075509
Z13VVL15	18	-5.61777778	1.20997596
Z13VVL20	18	-8.28000000	1.48011923
Z13VVL25	18	-7.93777778	1.74016752
Z13VVL35	18	-10.95611111	2.22963764
Z13VVL40	18	-11.43000000	2.34854899
Z13VVL45	18	-11.36777778	2.55571230
Z16HHL5	17	-11.81235294	3.20772803
Z16HHL10	17	-15.80470588	2.97501705
Z16HHL15	17	-19.23823529	2.80032194
Z16HHL20	17	-23.88411765	2.15323321
Z16HHL25	17	-23.75647059	2.34615627
Z16HHL35	17	-29.83294118	2.22295908
Z16HHL40	17	-32.40764706	2.23427150
Z16HHL45	17	-34.22882353	2.48730749
Z16HVL5	23	-15.16478261	1.55216526
Z16HVL10	23	-24.06913043	1.31551895
Z16HVL15	23	-28.56869565	1.04766973
Z16HVL20	23	-32.91652174	1.78491051
Z16HVL25	23	-33.68913043	1.97166730
Z16HVL35	23	-37.66130435	2.89245304
Z16HVL40	23	-40.00217391	3.21058046
Z16HVL45	23	-40.45695652	3.40086411
Z4HHL5	16	-11.07375000	3.60056084
Z4HHL10	16	-16.19062500	1.93703027
Z4HHL15	16	-20.50437500	1.62760343

Table (cont'd) Dalhart - Bare Combo

STATISTICAL ANAL

VARIABLE	N	MEAN	STD DEV
Z4HHL20	16	-24.25875000	1.53775973
Z4HHL25	16	-27.87812500	1.11458942
Z4HHL35	16	-35.60625000	1.31438642
Z4HHL40	16	-35.89687500	1.55726563
Z4HHL45	16	-37.43187500	1.28067284
Z4HVL5	17	-18.43764706	4.90101588
Z4HVL10	17	-24.43058824	2.91541050
Z4HVL15	17	-30.67588235	2.60596685
Z4HVL20	17	-37.88411765	2.53319477
Z4HVL25	17	-42.43470588	2.31208271
Z4HVL35	17	-50.63000000	2.11766381
Z4HVL40	17	-52.46823529	2.50448906
Z4HVL45	17	-54.24823529	2.05764804
Z475HL5	20	25.19550000	12.55220697
Z475HL10	20	17.08100000	8.66455994
Z475HL15	20	11.26400000	6.12721831
Z475HL20	20	6.83550000	4.53838190
Z475HL25	20	2.80900000	2.98163660
Z475HL35	20	-4.76900000	2.96213632
Z475HL40	20	-7.21200000	3.48589126
Z475HL45	20	-10.93850000	3.65600627
Z475VL5	23	20.64434783	5.48915362
Z475VL10	23	8.48652174	4.06676397
Z475VL15	23	0.58347826	5.14334929
Z475VL20	23	-2.71391304	5.54743818
Z475VL25	23	-7.24260870	5.61132881
Z475VL35	23	-12.29217391	5.46771346
Z475VL40	23	-14.68173913	5.86826337

Table 9 (con't)

Dalhart - Bare Combo

STATISTICAL ANAL

VARIABLE	N	MEAN	STD DEV
Z475VL45	23	-16.00521739	5.36163210
ZNS1	22	1.36813636	0.81352843
ZNS2	22	2.21322727	1.26657821
ZNS3	22	2.00890909	1.24049068
ZNS4	22	6.38522727	3.43069574
ZNS5	22	4.85795455	2.54584778
ZNS6	18	17.56300000	6.44529296
ZNS7	18	7.21205556	2.96896990
ZNS8	22	27.94545455	7.44770513
ZMFMRHL	16	274.86250000	16.74888554
ZMFMRHC	16	272.73125000	9.63879099
ZMFMRVC	16	281.55000000	10.72573230
ZFLD02	24	5.45416667	2.86932490
ZFLD25	24	8.62083333	3.80182784
ZFLD515	24	12.47500000	3.65801681
ZFLD015	24	7.77916667	6.04986375
ZFLD1530	24	11.66250000	8.88402633
ZFLD3045	24	14.25833333	10.71224073
Z1SM02	18	4.84444444	2.63689261
Z1SM25	18	6.99444444	2.93547716
Z1SM515	18	10.94444444	3.01783370
Z1SM015	18	5.44444444	5.14692624
Z1SM1530	18	10.17222222	9.72255144
Z1SM3045	18	12.66111111	11.94138325
ZPRT5	24	27.44583333	7.59393231
Z2SM02	22	5.63636364	2.82700337
Z2SM25	22	8.84090909	3.72349798
Z2SM515	22	12.42272727	3.83963438
Z2SM015	22	7.35000000	6.15117101
Z2SM1530	22	11.19090909	9.03136909
Z2SM3045	22	13.76818182	11.02276373

Table 20

Correlation coefficients:
Bare Combo - Dalhart

FLD AVE

	0-2	2-5	5-15	0-15	15-30	30-45
VV 13.3∠10	.71	.70	.56	.37	.03	.00
VV 13.3∠15	.63	.66	.72	.70	.47	.44
VV 13.3∠20	.33	.12	.39	.90	.85	.84
HH 1.6∠5	.80	.88	.71	.07	-.19	-.23
HH 1.6∠15	.80	.82	.57	-.01	-.30	-.34
HV 1.6∠15	.53	.48	.54	.55	.29	.29
HV 1.6∠20	.56	.31	.46	.69	.64	.64
HV 1.6∠25	.52	.29	.44	.73	.77	.75
HH .4∠15	.56	.77	.77	.05	.07	.05
HH .4∠20	.53	.67	.82	.35	.34	.34
HV .4∠20	.68	.81	.87	.39	.26	.24
HV .4∠25	.70	.74	.80	.46	.30	.28
HH 4.75∠15	.05	.31	.26	.07	-.05	-.06
HH 4.75∠20	.04	.34	.35	.18	.07	.06
HH 4.75∠40	.01	.07	.36	.58	.77	.78
HV 4.75∠5	.59	.76	.62	.13	-.06	-.08
HV 4.75∠15	.41	.38	.43	.41	.53	.51
NS 3	.05	.54	.55	.24	-.04	-.02
NS 4	-.18	.12	.31	.32	.42	.43
MFMR HL	-.40	-.76	-.58	.04	.12	.14
Pre 5	-.28	.11	.10	-.18	-.19	-.17

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Table 21

Single Variable Regressions for FLD Ø-2 Dalhart Bare Combo

Independent Variable	Intercept	Coefficient	R^2	S.E.E.
13.3VVL10	7.42	1.76	.504	
1.6 HHL15	20.31	.77	.645	
1.6 HVL20	35.72	.91	.317	
.4 HHL15	23.58	.90	.316	
.4 HVL25	40.54	.83	.495	
4.75 HHL15	5.28	.02	.002	
4.75 HVL5	-.66	.30	.347	
NS 1	5.75	-.037	.000	
NS 2	6.01	-.14	.004	
NS 3	5.46	.11	.0026	
NS 4	6.67	-.15	.033	
NS 5	6.31	-.12	.012	
NS 6	8.43	-.13	.110	
NS 7	7.66	-.216	.062	
NS 8	10.28	-.16	.182	
MFMR HL	43.62	-.14	.81	
MFMR HC	59.56	-.199	.545	
MFMR VC	56.44	-.182	.563	
Prt 5	8.43	-.108	.083	

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Table 22

Elementary Statistics: Dalhart-Combined Stubble

STATISTICAL ANAL

VARIABLE	N	MEAN	STD DEV
S13VVL5	43	1.90116279	2.62231287
S13VVL10	43	-0.71651163	1.69957261
S13VVL15	43	-5.01255814	1.61855181
S13VVL20	43	-8.01511628	1.39701616
S13VVL25	43	-7.82767442	1.60838848
S13VVL35	43	-11.28116279	1.72800767
S13VVL40	42	-11.89333333	1.81436230
S13VVL45	40	-11.95275000	1.83267912
S16HHL5	41	-11.30634146	3.74127235
S16HHL10	41	-16.12341463	2.90256749
S16HHL15	41	-18.23926829	3.16448526
S16HHL20	41	-22.52536585	1.99199535
S16HHL25	41	-21.58195122	2.56491834
S16HHL35	41	-27.49414634	2.78711856
S16HHL40	40	-30.84125000	2.87572170
S16HHL45	38	-32.56421053	2.73561459
S16HVL5	53	-14.75301887	1.71532637
S16HVL10	53	-24.00037736	1.34247470
S16HVL15	53	-28.13490566	1.30322768
S16HVL20	53	-32.13283019	1.81434707
S16HVL25	53	-32.89433962	1.94384186
S16HVL35	53	-36.80226415	3.24317724
S16HVL40	51	-39.36960784	3.27598166
S16HVL45	49	-39.99959184	3.09135351
S4HHL5	39	-8.73948718	3.78176995
S4HHL10	39	-14.41666667	2.16404754
S4HHL15	39	-18.71692308	1.80735217

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Table 22 (10,4) Dalhart-Combined Stubble S T A T I S T I C A L   A N A L

VARIABLE	N	MEAN	STD DEV
S4HHL20	39	-22.65076923	2.09748143
S4HHL25	39	-26.66487179	1.62372196
S4HHL35	39	-34.11307692	1.43216647
S4HHL40	38	-35.07236842	2.31327478
S4HHL45	36	-36.20694444	2.52476853
S4HVL5	41	-16.26390244	4.58601890
S4HVL10	41	-21.86585366	3.06950727
S4HVL15	41	-28.44439024	3.41996422
S4HVL20	41	-35.85780488	3.32944178
S4HVL25	41	-40.90634146	2.83029041
S4HVL35	41	-49.63219512	2.21592589
S4HVL40	40	-50.67750000	2.73534112
S4HVL45	38	-52.75394737	2.61391447
S475HL5	47	27.88191489	2.76442355
S475HL10	47	19.65510638	2.69659276
S475HL15	47	13.00170213	2.80915608
S475HL20	47	8.13851064	2.84764203
S475HL25	47	3.45234043	2.82875085
S475HL35	47	-5.34000000	2.95426883
S475HL40	46	-7.85978261	3.14368749
S475HL45	44	-11.91022727	3.44794073
S475VL5	53	20.60867925	5.00188620
S475VL10	53	8.46509434	3.93437642
S475VL15	53	0.53660377	4.81970073
S475VL20	53	-2.91924528	4.96746331
S475VL25	53	-7.37830189	5.23132199
S475VL35	53	-13.10150943	5.10128015
S475VL40	51	-15.93176471	5.23862032

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Table 22 (con't) Dalhart - Combined Stubble STATISTICAL ANAL

VARIABLE	N	MEAN	STD DEV
S475VL45	49	-16.72775510	4.93407804
SNS1	52	1.51980769	0.82858663
SNS2	52	2.45823077	1.36964397
SNS3	52	2.37144231	1.31086274
SNS4	52	5.87300000	3.20183601
SNS5	52	4.62180769	2.52288755
SNS6	42	18.80509524	6.45283584
SNS7	42	8.34545238	3.18819377
SNS8	52	28.66923077	7.72372303
SMFMRHL	40	275.14750000	18.42186532
SMFMRHC	40	271.12500000	10.71236405
SMFMRVC	40	280.99000000	11.40617916
SFLD02	56	6.05000000	3.80740905
SFLD25	56	10.86785714	5.44627002
SFLD515	56	12.89107143	4.24038063
SFLD015	56	5.79642857	6.91827525
SFLD1530	56	6.34285714	7.46246016
SFLD3045	56	7.84107143	9.19426257
S1SM02	44	5.62045455	3.92277664
S1SM25	44	10.16818182	5.91080102
S1SM515	44	12.03636364	4.16106487
S1SM015	44	3.40000000	5.72306634
S1SM1530	44	3.96136364	6.58066993
S1SM3045	44	4.96590909	8.23178590
SPRT5	56	28.02857143	7.81319896
S2SM02	52	6.36538462	3.91447212
S2SM25	52	11.39423077	5.30580198
S2SM515	52	12.97115385	4.33233789
S2SM015	52	5.43269231	7.04154955
S2SM1530	52	5.70769231	7.35265315
S2SM3045	52	7.00576923	9.00345061

Table 23

Correlation Coefficients: Stubble - Dalhart

	FLD 0-2	2-5	5-15	0-15	15-30	30-45
VV 13.3 L15	.54	.47	.61	.63	.62	.62
VV 13.3 L20	.48	.41	.64	.54	.54	.54
HH 1.6 L5	.77	.58	.49	.48	.42	.40
HH 1.6 L15	.70	.48	.56	.60	.56	.55
HV 1.6 L15	.55	.35	.54	.45	.43	.43
HV 1.6 L20	.65	.50	.64	.34	.31	.30
HV 1.6 L25	.62	.58	.73	.35	.30	.29
HH .4 L15	.63	.63	.44	.15	.11	.09
HH .4 L20	.46	.44	.42	.50	.46	.44
HV .4 L5	.54	.57	.66	.48	.43	.40
HV .4 L15	.74	.81	.78	.39	.36	.34
HV .4 L20	.55	.59	.73	.56	.54	.53
HH 4.75 L10	.44	.51	.43	.44	.42	.41
HH 4.75 L15	.41	.51	.60	.56	.55	.54
HH 4.75 L20	.56	.47	.68	.54	.53	.53
HV 4.75 L5	.72	.75	.60	.30	.23	.21
HV 4.75 L20	.68	.71	.66	.44	.37	.35
NS 6	-.61	-.44	-.18	-.06	-.05	-.02
NS 7	-.58	-.38	-.13	-.07	-.04	-.03
MFMR HL	-.76	-.57	-.28	.01	.04	.05
PCS 5	-.21	.17	.05	-.09	-.10	-.09

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Table 24

Single Variable Regressions for FLD Ø-2
Dalhart - Stubble

Independent Variable	Intercept	Coefficient	R^2	S.E.E.
13.3VV L15	12.40	1.29	.293	
1.6HH L15	21.84	.86	.491	
1.6HVL20	50.87	1.39	.422	
.4HH L15	31.53	1.37	.392	
.4HVL15	31.17	.88	.552	
4.75HH L10	-6.40	.64	.196	
4.75HVL5	-5.14	.55	.525	
NS 1	6.31	-.005	.000	
NS 2	6.17	.05	.000	
NS 3	6.20	.04	.000	
NS 4	5.89	.07	.003	
NS 5	5.63	.14	.009	
NS 6	13.56	-.33	.379	
NS 7	12.64	-.638	.339	
NS 8	11.02	-.164	.110	
MFMR HL	51.59	-.166	.615	
MFMR HC	50.15	-.163	.200	
MFMR VC	49.54	-.155	.206	
Prt 5	8.79	-.097	.040	

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Table 25

Elementary Statistics: Dalhart - Disked Stubble

S T A T I S T I C A L   A N A L

VARIABLE	N	MEAN	STD DEV
D13VVL5	23	1.08565217	2.64430232
D13VVL10	23	-1.33739130	1.76480032
D13VVL15	23	-5.27782609	1.20545335
D13VVL20	23	-7.93434783	0.86443795
D13VVL25	23	-7.56782609	0.81359447
D13VVL35	23	-10.94173913	1.20501849
D13VVL40	23	-11.46695652	1.33764867
D13VVL45	22	-11.44636364	1.40944618
D16HHL5	23	-12.28521739	3.24394663
D16HHL10	23	-17.01652174	2.54618718
D16HHL15	23	-18.87304348	2.38056608
D16HHL20	23	-22.59956522	1.85710057
D16HHL25	23	-20.68695652	2.33494488
D16HHL35	23	-26.74304348	2.41411274
D16HHL40	23	-30.32217391	2.08535795
D16HHL45	22	-32.06772727	1.94635418
D16HVL5	23	-14.95565217	1.53938543
D16HVL10	23	-24.31913043	1.25113735
D16HVL15	23	-28.32434783	1.25364859
D16HVL20	23	-32.01391304	1.87683423
D16HVL25	23	-32.60434783	1.73101343
D16HVL35	23	-36.37434783	3.15882865
D16HVL40	23	-38.65782609	3.57916440
D16HVL45	22	-39.69363636	3.04596149
D4HHL5	23	-9.33826087	2.80849952
D4HHL10	23	-14.54782609	2.24045441
D4HHL15	23	-18.84695652	1.81101035

Table 25 (con't) Dalhort- Disked Stubble STATISTICAL ANA

VARIABLE	N	MEAN	STD DEV
D4HHL20	23	-23.11260870	1.84880605
D4HHL25	23	-26.61739130	1.64174579
D4HHL35	23	-34.03434783	1.49474481
D4HHL40	23	-35.21521739	2.86852333
D4HHL45	22	-36.14818182	3.01964778
D4HVL5	23	-16.80130435	3.32534660
D4HVL10	23	-21.88739130	3.44759365
D4HVL15	23	-28.56565217	3.63397957
D4HVL20	23	-36.22043478	3.23854973
D4HVL25	23	-40.51782609	2.86212565
D4HVL35	23	-49.78043478	2.12338597
D4HVL40	23	-51.30086957	2.15920632
D4HVL45	22	-52.58772727	2.86741452
D475HL5	23	27.36869565	3.23657409
D475HL10	23	18.82043478	2.95008394
D475HL15	23	12.29217391	2.64681619
D475HL20	23	7.83130435	2.40490088
D475HL25	23	3.34347826	2.36202265
D475HL35	23	-5.35217391	2.46169557
D475HL40	23	-7.88086957	2.77657721
D475HL45	22	-12.27363636	2.69529316
D475VL5	23	20.02130435	4.82368617
D475VL10	23	7.91695652	3.65418245
D475VL15	23	-0.43217391	4.36344938
D475VL20	23	-3.86869565	4.42184074
D475VL25	23	-8.67652174	4.52518770
D475VL35	23	-14.39782609	3.99094311
D475VL40	23	-17.16434783	4.23405547

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Table 5 (cont'd) Dalhart - Disked Stubble

STATISTICAL ANAL

VARIABLE	N	MEAN	STD DEV
D475VL45	22	-18.26727273	3.91332909
DNS1	24	1.49287500	0.88728983
DNS2	24	2.39658333	1.50971664
DNS3	24	2.38341667	1.48904241
DNS4	24	5.28287500	3.17907887
DNS5	24	4.30054167	2.64801839
DNS6	18	19.72761111	6.67083484
DNS7	18	8.96405556	3.09417047
DNS8	24	28.78333333	8.17167253
DMFMRHL	24	276.91250000	17.79558598
DMFMRHC	24	273.87500000	9.35392268
DMFMRVC	24	283.70833333	10.06478651
DFLD02	24	6.01250000	4.15873230
DFLD25	24	11.31666667	6.53543297
DFLD515	24	12.50833333	4.00672442
DFLD015	24	0	0
DFLD1530	24	0	0
DFLD3045	24	0	0
D1SM02	24	6.11666667	4.33134849
D1SM25	24	11.45000000	6.63966998
D1SM515	24	12.60833333	4.00553060
D1SM015	24	0	0
D1SM1530	24	0	0
D1SM3045	24	0	0
DPRT5	24	28.24583333	8.29326490
D2SM02	24	6.06666667	4.34267666
D2SM25	24	11.36250000	6.59623163
D2SM515	24	12.46250000	3.96975659
D2SM015	24	0	0
D2SM1530	24	0	0
D2SM3045	24	0	0

Table 20 Correlation Coefficients: Disked Stubble - Dalhart

FLD AVE.

	0-2	2-5	5-15
VV 13.3L15	.58	.56	.30
VV 13.3L20	.54	.45	.16
HH 1.6L5	.77	.64	.52
HH 1.6L15	.71	.55	.41
HV 1.6L20	.62	.53	.59
HV 1.6L25	.62	.59	.68
HH .4L5	.49	.56	.54
HH .4L15	.80	.79	.68
HV .4L10	.57	.69	.66
HV .4L15	.79	.84	.75
HH 4.75L5	.44	.55	.37
HH 4.75L10	.37	.45	.27
HV 4.75L15	.68	.72	.65
HV 4.75L20	.69	.75	.70
HV 4.75L25	.72	.78	.75
NS 6	-.64	-.51	-.49
NS 7	-.60	-.46	-.45
MFMR HL	-.83	-.60	-.50
PrE 5	-.11	.20	.21

Table 27

Single Variable Regressions for FLD Ø-2
Dalhart - Disked Stubble

Independent Variable	Intercept	Coefficient	R^2	S.E.E.
13.3VVL15	16.78	2.03	.333	
1.6HHL5	18.44	1.00	.593	
1.6HV L25	55.68	1.52	.385	
.4 HH L15	41.55	1.88	.645	
.4HVL15	32.59	.93	.630	
4.75HH L5	-9.79	.57	.194	
4.75HVL25	11.90	.67	.516	
NS 1	5.76	.16	.001	
NS 2	5.51	.21	.005	
NS 3	5.65	.149	.003	
NS 4	5.56	.08	.004	
NS 5	5.21	.185	.013	
NS 6	14.69	-.37	.40	
NS 7	14.17	-.769	.363	
NS 8	8.67	-.09	.033	
MFMR HL	59.54	-.19	.684	
MFMR HC	54.38	-.17	.157	
MFMR VC	52.39	-.16	.156	
Prt 5	7.52	-.05	.011	

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Table 28 Elementary Statistics: Dalhart - Corn

STATISTICAL ANAL

VARIABLE	N	MEAN	STD DEV
C13VVL5	32	0.70968750	1.25173295
~~C13VVL10~~	~~32~~	~~-0.74000000~~	~~0.98767893~~
C13VVL15	32	-3.79812500	0.93199210
C13VVL20	32	-5.65187500	0.88472499
~~C13VVL25~~	~~32~~	~~-4.52500000~~	~~0.89408811~~
C13VVL35	32	-6.81781250	0.88748915
C13VVL40	32	-7.05562500	0.82112015
~~C13VVL45~~	~~31~~	~~-7.13967742~~	~~0.79711766~~
C16HHL5	32	-14.81093750	1.93024712
C16HHL10	32	-16.56468750	1.68227953
~~C16HHL15~~	~~32~~	~~-16.80343750~~	~~1.79439739~~
C16HHL20	32	-19.01343750	1.40370618
C16HHL25	32	-17.25062500	1.44779017
~~C16HHL35~~	~~32~~	~~-19.80718750~~	~~1.27445683~~
C16HHL40	32	-22.35218750	1.28228811
C16HHL45	31	-23.02774194	1.10121966
~~C16HVL5~~	~~32~~	~~-15.04406250~~	~~1.55281401~~
C16HVL10	32	-22.14406250	0.98518988
C16HVL15	32	-23.80406250	1.37190910
~~C16HVL20~~	~~32~~	~~-24.20343750~~	~~1.32795649~~
C16HVL25	32	-24.06093750	1.56291159
C16HVL35	32	-25.59250000	1.47282042
~~C16HVL40~~	~~32~~	~~-28.80156250~~	~~1.48726662~~
C16HVL45	31	-28.31903226	1.43589543
C4HHL5	32	-9.93562500	3.89439791
~~C4HHL10~~	~~32~~	~~-15.05906250~~	~~2.50631893~~
C4HHL15	32	-18.37031250	2.38265437

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Table 28 (con't) Dalhart - Corn

STATISTICAL ANAL

VARIABLE	N	MEAN	STD DEV
C4HHL20	32	-21.46406250	2.54810981
C4HHL25	32	-23.51531250	2.22451152
C4HHL35	32	-28.24437500	2.11488113
C4HHL40	32	-28.15843750	1.93948964
C4HHL45	31	-28.51967742	1.61196667
C4HVL5	32	-17.40468750	2.96347767
C4HVL10	32	-21.37250000	3.10635042
C4HVL15	32	-25.72718750	3.10575453
C4HVL20	32	-29.19781250	3.13928463
C4HVL25	32	-32.17343750	2.71554024
C4HVL35	32	-41.44781250	2.36756406
C4HVL40	32	-42.85062500	2.17508315
C4HVL45	31	-42.72387097	2.33852044
C475HL5	32	25.97281250	2.77026403
C475HL10	32	18.25343750	2.15113265
C475HL15	32	13.33062500	2.19200297
C475HL20	32	10.01375000	1.94941637
C475HL25	32	6.65781250	1.89663664
C475HL35	32	0.05656250	1.77694484
C475HL40	32	-1.89906250	1.83397569
C475HL45	31	-5.79516129	2.05107593
C475VL5	32	20.91218750	3.12055695
C475VL10	32	14.50406250	4.14956808
C475VL15	32	9.15250000	4.67734899
C475VL20	32	6.86906250	4.74431433
C475VL25	32	1.91250000	5.04773919
C475VL35	32	-3.67781250	4.72321223
C475VL40	32	-5.62531250	4.62742106

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Table 28 (cont) Dalhart - Corn

VARIABLE	N	MEAN	STD DEV
C475VL45	31	-7.25935484	4.50986765
CNS1	32	0.55678125	0.27186165
CNS2	32	0.90928125	0.50589373
CNS3	32	0.54125000	0.30117126
CNS4	32	7.88878125	4.19475205
CNS5	32	4.54009375	2.52773155
CNS6	24	7.73145833	2.16344763
CNS7	24	2.81991667	0.81888545
CNS8	32	22.58750000	3.53240757
CMFMRHL	32	282.35937500	6.70016174
CMFMRHC	32	272.57500000	5.88935617
CMFMRVC	32	281.90312500	6.39397319
CFLD02	32	16.84375000	8.53070120
CFLD25	32	15.80625000	6.12103394
CFLD515	32	18.32500000	6.10494247
CFLD015	32	17.81562500	6.41249332
CFLD1530	32	19.80312500	5.46292397
CFLD3045	32	20.11562500	5.22222974
C1SM02	32	16.79062500	8.78162889
C1SM25	32	15.74687500	6.21927204
C1SM515	32	18.39062500	6.16976809
C1SM015	32	17.80000000	6.48074070
C1SM1530	32	20.04375000	5.80149800
C1SM3045	32	20.19375000	5.50084671
CPRT5	32	22.20312500	3.35804132
C2SM02	32	16.85937500	8.60006974
C2SM25	32	15.77812500	6.09927200
C2SM515	32	18.48125000	6.11024721
C2SM015	32	17.81250000	6.41720218
C2SM1530	32	19.78750000	5.46104976
C2SM3045	32	20.12812500	5.15615726

Table 24 Correlation Coefficients: Corn - Dalhart

FLD AVE

	0-2	2-5	5-15	0-15	15-30	30-45
VV 13.3 25	.46	.45	.32	.37	.30	.21
VV 13.3 15	.60	.57	.51	.55	.51	.46
HH 1.6 25	.58	.57	.52	.56	.41	.43
HH 1.6 15	.68	.66	.57	.63	.50	.46
HV 1.6 15	.67	.63	.57	.63	.49	.45
HV 1.6 25	.63	.61	.56	.61	.49	.46
HH 4 15	.71	.70	.71	.72	.64	.62
HH 4 25	.80	.77	.78	.80	.71	.69
HV 4 15	.68	.66	.71	.70	.66	.61
HH 4.75 25	.39	.40	.45	.42	.42	.40
HV 4.75 15	.46	.42	.42	.43	.55	.32
NS 4	.30	.31	.40	.36	.37	.36
NS 7	-.33	-.28	-.22	-.27	-.17	-.12
MFMR PL	-.27	-.23	-.13	-.18	-.09	-.03
PRT S	-.10	-.07	.02	-.04	.01	.03

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Table 30

Single Variable Regressions for FLD Ø-2
Dalhart - Corn

Independent Variable	Intercept	Coefficient	R^2	S.E.E.
13.3VVL15	37.57	5.45	.356	
1.6HHL15	71.01	3.22	.459	
1.6HVL15	115.88	4.16	.447	
.4HHL25	88.58	3.05	.633	
.4HVL20	70.78	1.84	.457	
4.75HHL5	-14.17	1.19	.150	
4.75HVL15	9.09	.84	.21	
NS 1	15.37	2.62	.007	
NS 2	15.00	2.02	.014	
NS 3	16.03	1.49	.003	
NS 4	12.04	.607	.089	
NS 5	12.84	.88	.068	
NS 6	28.00	-1.21	.099	
NS 7	28.04	-3.33	.108	
NS 8	24.28	-.33	.018	
MFMR HL	113.48	-.34	.072	
MFMR HC	34.9	-.06	.002	
MFMR VC	35.51	-.06	.002	
Prt5	22.61	-.26	.010	

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Correlation Coefficients: FLD vs FLD

Table 31

Bare Combo - Dalhart

FLD.AVE	FLDAVE 0-2	2-5	5-15	0-15	15-30	30-45
0-2	—	.82	.69	.31	.13	.09
2-5		—	.87	.37	.05	.08
5-15			—	.64	.38	.37
0-15				—	.85	.85
15-30					—	.99
30-45						—

Stubble

FLD.AVE	FLD AVE 0-2	2-5	5-15	0-15	15-30	30-45
0-2	—	.89	.70	.23	.16	.14
2-5		—	.75	.14	.07	.05
5-15			—	.56	.54	.52
0-15				—	.99	.98
15-30					—	.99
30-45						—

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Table 32 Correlation Coefficients: FLD vs FLD

Corn - Dalhart

FLD AVE

FLD AVE	0-2	2-5	5-15	0-15	15-30	30-45
0-2	—	.97	.95	.97	.87	.79
2-5		—	.96	.99	.91	.86
5-15			—	.99	.97	.93
0-15				—	.95	.90
15-30					—	.97
30-45						—

Disked Stubble

FLD AVE

FLD AVE	0-2	2-5	5-15
0-2	—	.93	.84
2-5		—	.90
5-15			—

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III. Eigenvector and Factor Analysis

The utility of eigenvector and factor analyses was briefly explored. An important issue was examining the sense of the general and comparative movements (or trajectories) of the soil moisture variable (as affected by measurement depth) and for the scatterometers (as influenced by increasing look angle from nadir and polarization). Ideally, if the soil moisture was constant for all depths, perhaps the comparative trajectories of depth, look angle, and polarization would be suggestive of types of sensor kernels or weighting functions useful for a subsequent study of deconvolution of the soil moisture sensor measurements.

Obviously a significant problem is the extremely small sample size vis a vis the number of variables and the consequent constraints placed on such a general statistical study. The utility of factor analysis has been both advocated (cf. Vande Geer, 1971; Lawley and Maxwell, 1963) and maligned (Armstrong, 1967) at various times. Recently it was employed as an interpretation help (in concert with unsupervised clustering) for the complex radiometric and ground truth data in the microwave remote sensing of snow (Mätzler et al., 1982). Frank (1979) also used it with clustering in a categorization of watershed units.

Additional considerations on the validity and use of the factor graphs includes:

- o The potential of exploratory insight into the interactions* concealed within the data set;
- o The reasonable relatedness of the factor displays - via a rescaling and normalization of the factor axes to the eigenvectors. For example, a comparative display of the eigenvectors and factors of selected variables from the Guymon Bare and Dalhart Stubble data sets (Factor BX and Factor SX runs) are shown in Figures 31a' (p. 194) and 36a' (p 221).

*Note, for example in Figure 37, the 'oscillatory' variable-trajectory behavior (in factor space) of the 1.6 HH and 1.6 HV sensors for the Dalhart corn data and the contrasting, stationary trajectories for the 4.75 Ghz HH and HV sensors.

- The 'parent' eigenvector transformation has found very legitimate and extensive use in similar form in image enhancements for geophysical prospecting (Moik, 1981) and for crop phenology trajectories for multidate image analysis (Hallada, 1980).

An overview of the data sets analyzed herein and the cumulative fraction of variance represented by the first four selected eigenvectors is shown in Table 33. Similarly the cumulative fraction of the four rotated factors is included. This table overviews the second major run of eigenvector and factor analyses. It was preceded by the initial runs summarized in Table 34 which included all sensor variables. Table 33 and the factor graphs included herein have excluded the .4 Ghz HV and HH sensor outputs. This was done for two reasons: the correlation graphs shown earlier summarized the rather 'unusual' correlation behavior of the .4 Ghz data as a function of increasing look angle; hence further statistical studies based on such correlations would be suspect. Additionally, the large number of data points on the factor graphs 'begs' for some relief (especially in a format not showing the multicolor curves of the original).

Briefly the data transformations were effected via the SAS factor procedure. The sequence is similar to that cited by Mätzler et al. (1982):

- eigenvectors of the correlation matrix were determined;
- the eigenvectors were stretched via a coodinate frame weighting that yields factor axes;
- the centered data vectors were transformed into factor space via projections on the factor axes.

The sequence of data sets summarized by the factor graphs follows that of the preceding sections is:

TABLE 33 EIGENVECTOR + FACTOR ANALYSIS - OVERVIEW -
FINAL RUNS (EX: .4HH + .4HV)

RUN	#n	#var		1	2	3	4
Factor BX	15	49	eigenvalue	22.38	11.63	5.71	3.05
			Cum. %	45.7	69.4	81.1	87.3
			* rota. factor var.	17.4	10.9	7.8	6.7
Factor RX	10			26.56	9.62	5.78	2.58
				54.2	73.8	85.6	90.9
				16.57	15.13	8.69	4.15
Factor LX	14			26.86	8.47	6.10	2.80
				54.8	72.1	84.6	90.3
				21.28	10.96	7.30	4.68
Factor AX	7			32.10	7.06	5.26	2.23
				65.5	79.9	90.7	95.2
				14.67	12.30	15.27	4.93
Factor ZX	16	55		21.25	12.48	7.90	5.12
				38.6	61.3	75.7	85.0
				18.09	13.24	10.09	5.34
Factor SX	26	63		24.54	15.95	6.80	4.15
				39.0	64.3	75.1	81.6
				18.74	15.74	10.61	6.34
Factor CX	31	63		25.42	15.32	6.00	3.37
				40.4	64.7	74.2	79.5
				14.27	11.43	17.07	7.35

* note: Factor variance prior to rotation = eigenvalue

TABLE 34 EIGENVECTOR + FACTOR ANALYSIS – OVERVIEW

INITIAL RUNS

Run	#n	1	2	3	4
Factor B	15				
eigenvalue		25.99	13.67	11.30	4.17
Cumulative %		40.0	61.0	78.4	84.8
rotated factor variance		21.57	11.03	16.36	6.17
Factor R	10	28.84	16.22	7.36	4.42
		44.4	69.3	81.2	88.0
		15.36	17.89	10.05	13.92
Factor L	14	28.36	13.11	10.07	5.54
		43.6	63.8	79.3	87.8
		26.01	11.35	10.93	8.79
Factor A	8				
		53.2	77.3	88.9	94.5
		27.75	16.58	11.57	5.55
Factor Z	16	24.68	17.21	10.01	5.54
		34.8	59.0	73.1	80.9
		20.55	19.25	11.67	5.97
Factor S					
		36.5	56.5	67.5	74.3
		20.76	17.38	9.61	10.94
Factor C		30.08	15.88	6.16	3.74
		42.4	64.7	73.4	78.7

Additional Runs

ALFFC

BAREFC

MPARFC

MPERFC

Data Set Sequence of Factor Analysis Graphs

Guymon	run code*
Bare	B
Milo. Perp.	R
Milo. Par.	L
Alfalfa	A

Dalhart	
Bare combined	Z
Stubble <combined>	S
Disked Stubble	D
Corn	C

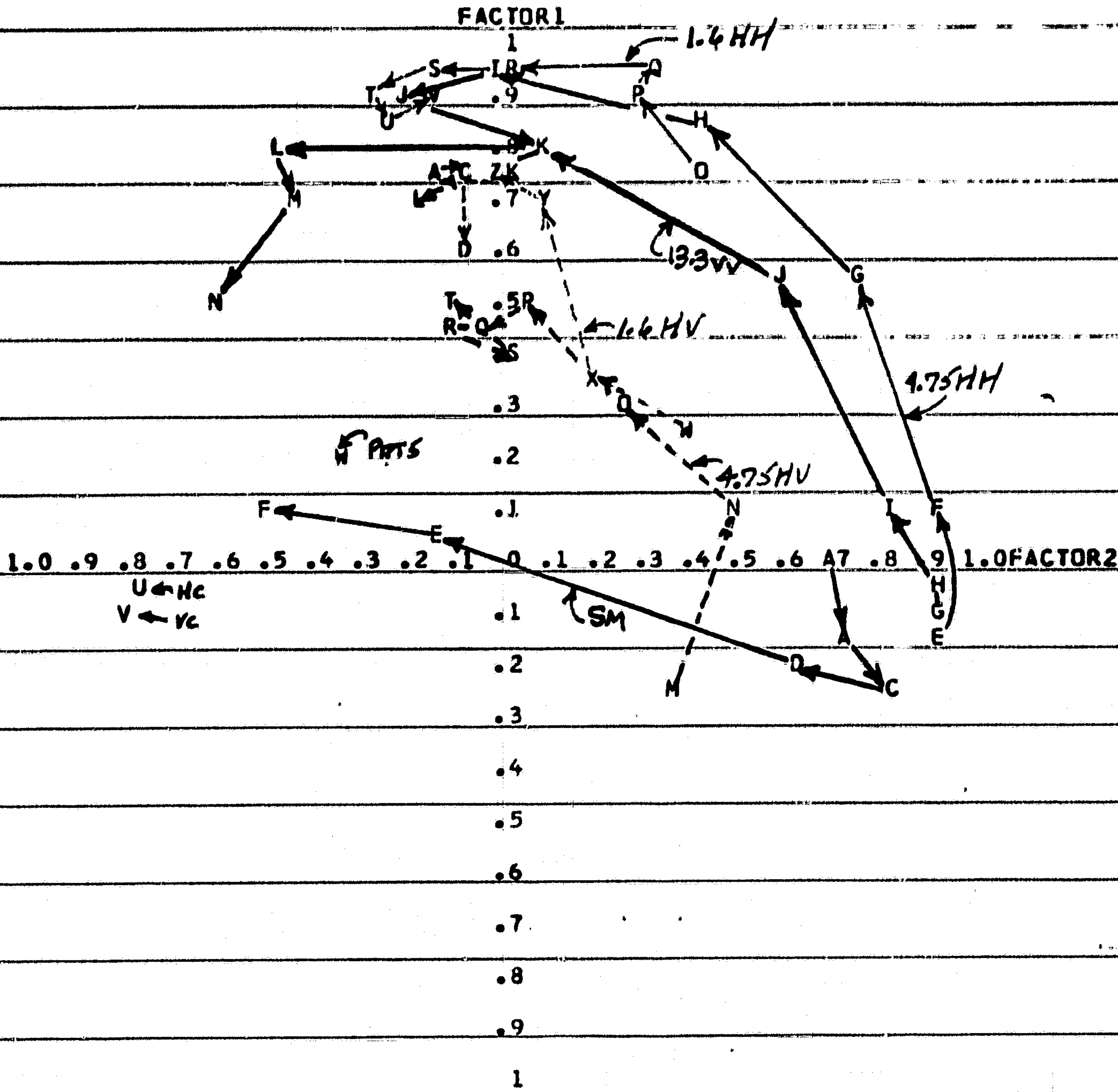
*Note: When the letter X follows it designates data sets from which the .4 HV and .4 HH scatterometer data has been removed.

For each field cover type, the graph and table sequence is the following:

- Trajectory plots (lines and data points) of highest two variance axes;
- Trajectory data points of third and fourth-ranked variance axes;
- Table of the four-factor loadings after rotation which produced the above graphs and the orthogonal transformation matrix;
- Table of four-factor loadings prior to rotation; and,
- Table of the four eigenvectors from which the factors were stretched and weighted.

Fig 31 Guymon - Bare (Factor Bx) - Variable Trajectories

a. PLOT OF FACTOR1 WITH FACTOR2



BSM02 =A	BSM25 =A	BSM59 =C	BSM915 =D	BSM1530 =E
BSM3045 =F	B13L5 =G	B13L10 =H	B13L15 =I	B13L20 =J
B13L25 =K	B13L35 =L	B13L40 =M	B13L45 =N	B16HHL5 =O
B16HHL10=P	B16HHL15=Q	B16HHL20=R	B16HHL25=S	B16HHL35=T
B16HHL40=U	B16HHL45=V	B16HVL5 =W	B16HVL10=X	B16HVL15=Y
B16HVL20=Z	B16HVL25=A	B16HVL35=A	B16HVL40=C	B16HVL45=D
B75HHL5 =E	B75HHL10=F	B75HHL15=G	B75HHL20=H	B75HHL25=I
B75HHL35=J	B75HHL40=K	B75HHL45=L	B75HVL5 =M	B75HVL10=N
B75HVL15=O	B75HVL20=P	B75HVL25=Q	B75HVL35=R	B75HVL40=S
B75HVL45=T	BHC =U	BVC =V	BPRT5 =W	

Fig 31 a' Guymon-Bare: Comparison Eigenvectors for Factor 3x - Variable Trajectories

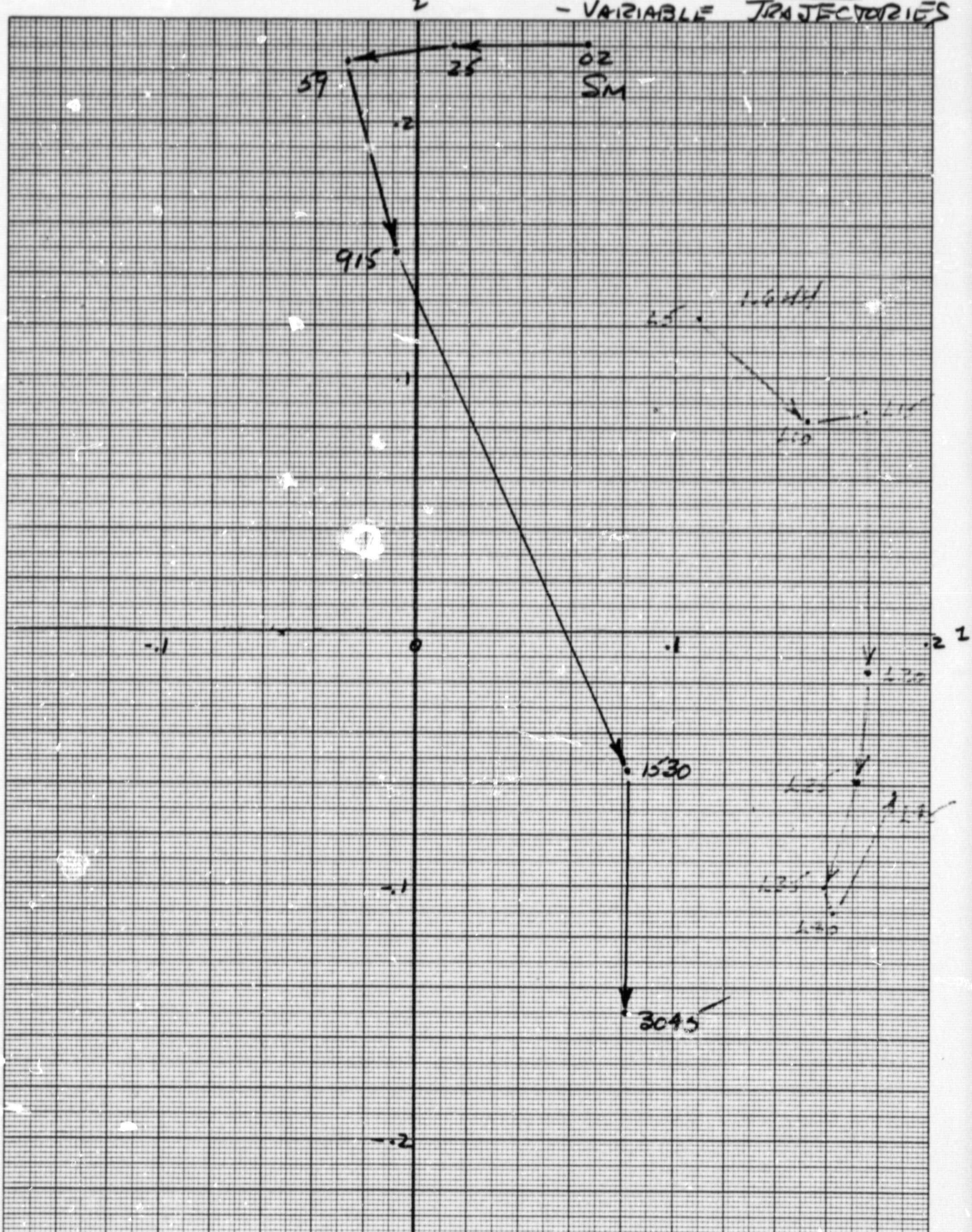
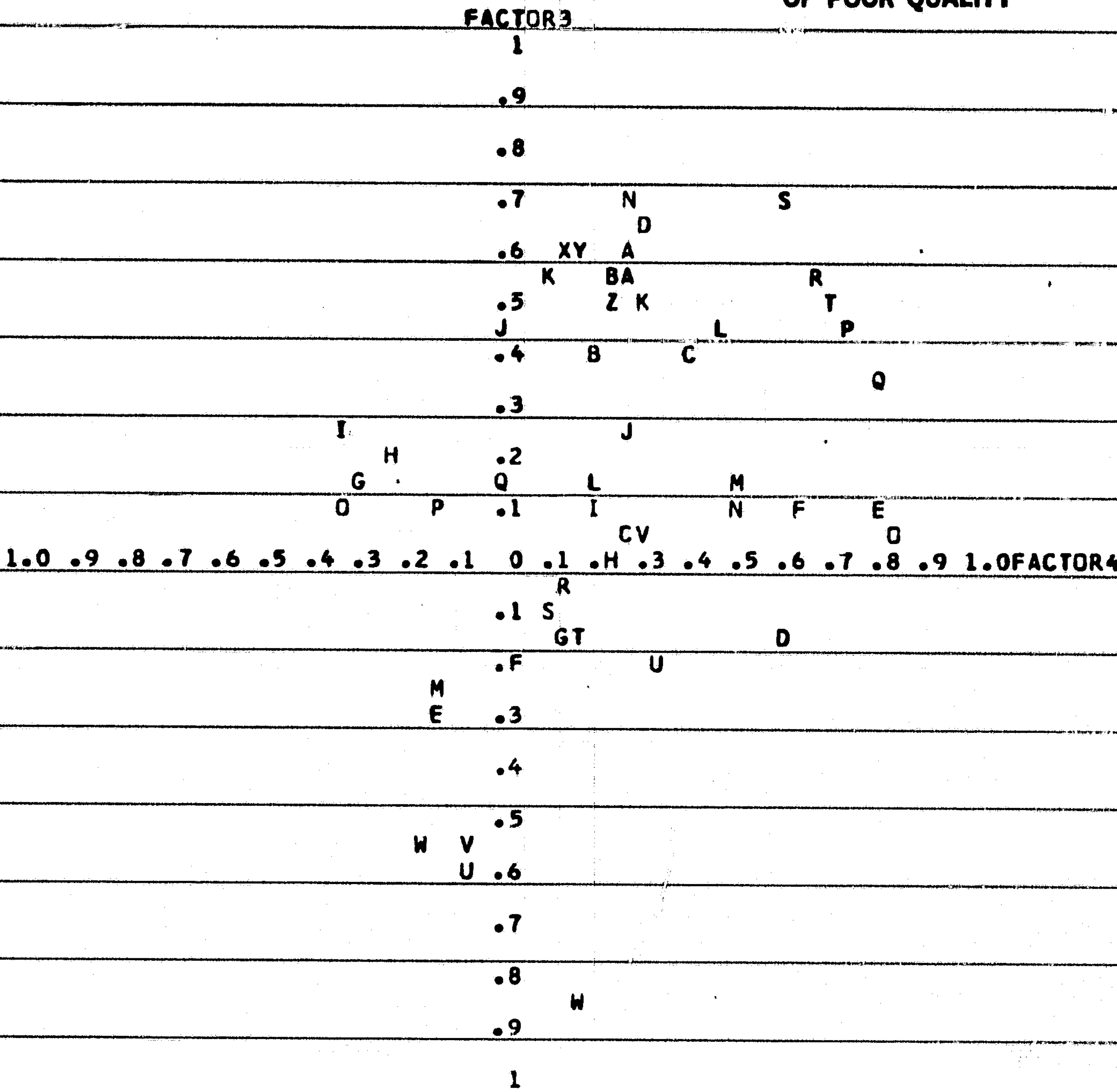


Fig 31 GUYMON - BARE (FACTOR Bx)

PLOT OF FACTOR3 WITH FACTOR4



BSM02 =A	BSM25 =B	BSM59 =C	BSM915 =D	BSM1530 =E
BSM3045 =F	B13L5 =G	B13L10 =H	B13L15 =I	B13L20 =J
B13L25 =K	B13L35 =L	B13L40 =M	B13L45 =N	B16HHL5 =O
B16HHL10=P	B16HHL15=Q	B16HHL20=R	B16HHL25=S	B16HHL35=T
B16HHL40=U	B16HHL45=V	B16HVL5 =W	B16HVL10=X	B16HVL15=Y
B16HVL20=Z	B16HVL25=A	B16HVL35=B	B16HVL40=C	B16HVL45=D
B75HHL5 =E	B75HHL10=F	B75HHL15=G	B75HHL20=H	B75HHL25=I
B75HHL35=J	B75HHL40=K	B75HHL45=L	B75HVL5 =M	B75HVL10=N
B75HVL15=O	B75HVL20=P	B75HVL25=Q	B75HVL35=R	B75HVL40=S
B75HVL45=T	BHC =U	BVC =V	BPRT5 =W	

TABLE 35 GUYMON BARE (FACTOR BX)

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a. ROTATED FACTOR PATTERN

		FACTOR1	FACTOR2	FACTOR3	FACTOR4
A	BSM02	0.00261	0.66885	0.61112	0.26569
B	BSM25	-0.15160	0.71588	0.39531	0.18813
C	BSM59	-0.23339	0.80808	0.03137	0.23848
D	BSM915	-0.22089	0.62298	-0.12601	0.59673
E	BSM1530	0.06688	-0.13666	0.09074	0.77509
F	BSM3045	0.09787	-0.50480	0.11384	0.61860
G	B13L5	-0.11372	0.91548	0.15228	-0.31466
H	B13L10	-0.06218	0.91964	0.20600	-0.25405
I	B13L15	0.10356	0.82132	0.23448	-0.33768
J	B13L20	0.53335	0.58486	0.44260	-0.00814
K	B13L25	0.78067	0.07384	0.52841	0.09504
L	B13L35	0.78518	-0.48386	0.12684	0.18610
M	B13L40	0.68356	-0.45450	0.16703	0.47585
N	B13L45	0.51566	-0.60133	0.07500	0.47138
	B16HHL5	0.74976	0.41045	0.09296	-0.34027
P	B16HHL10	0.90629	0.29232	0.08131	-0.16394
Q	B16HHL15	0.93282	0.30310	0.15352	-0.01224
R	B16HHL20	0.96627	0.01052	-0.05789	0.11276
S	B16HHL25	0.96710	-0.13817	-0.08282	0.06821
T	B16HHL35	0.89244	-0.26810	-0.15505	0.14038
U	B16HHL40	0.85554	-0.26481	-0.20268	0.31503
V	B16HHL45	0.90372	-0.16608	0.03598	0.27395
W	B16HVL5	0.22561	0.38141	-0.53872	-0.16875
X	B16HVL10	0.33086	0.16737	0.58523	0.11878
Y	B16HVL15	0.69219	0.09569	0.61634	0.13763
Z	B16HVL20	0.75789	-0.01135	0.50189	0.20223
A	B16HVL25	0.76576	-0.13395	0.55726	0.23627
A	B16HVL35	0.77187	-0.13954	0.54526	0.21734
B	B16HVL40	0.76773	-0.09277	0.40440	0.38008
D	B16HVL45	0.61872	-0.07685	0.64891	0.28212
E	B75HHL5	-0.15237	0.92171	-0.27783	-0.15140
F	B75HHL10	0.12071	0.93197	-0.18628	0.02004
G	B75HHL15	0.54481	0.76263	-0.14752	0.10186
H	B75HHL20	0.86358	0.40688	-0.01636	0.20278
I	B75HHL25	0.95983	-0.02616	0.11875	0.19700
J	B75HHL35	0.88512	-0.21316	0.22566	0.24831
K	B75HHL40	0.76715	0.00087	0.52340	0.28672
L	B75HHL45	0.70811	-0.19711	0.47072	0.44705
M	B75HVL5	-0.24095	0.34065	-0.24186	-0.16440
N	B75HVL10	0.11217	0.46892	0.68678	0.25272
O	B75HVL15	0.28460	0.24778	0.04321	0.82961
P	B75HVL20	0.48891	0.04212	0.46870	0.71386
Q	B75HVL25	0.47072	-0.05528	0.36498	0.77800
R	B75HVL35	0.46448	-0.11988	0.56835	0.63532
S	B75HVL40	0.41066	0.02404	0.68055	0.58299
T	B75HVL45	0.49371	-0.12961	0.50689	0.68595
U	BHC	-0.03535	-0.78488	-0.59071	-0.08013
V	BVC	-0.08267	-0.80061	-0.56540	-0.07091
ω	BPRT5	0.18750	-0.33851	-0.85057	0.14252

ORTHOGONAL TRANSFORMATION MATRIX

	1	2	3	4
1	0.83742	-0.04767	0.39525	0.37449
2	-0.03941	0.95050	0.29190	-0.09897
3	0.54465	0.15341	-0.61297	-0.55144
4	-0.02323	0.26598	-0.61874	0.73884

TABLE 35 GUYMON - BARE (Factor BX)

b. FACTOR PATTERN

	FACTOR1	FACTOR2	FACTOR3	FACTOR4
BSM02	0.31135	0.78773	-0.41708	-0.00398
BSM25	0.06562	0.78319	-0.31880	0.08833
BSM59	-0.13226	0.76283	-0.15388	0.37714
BSM915	-0.04101	0.50501	-0.27656	0.68968
BSM1530	0.38865	-0.18275	-0.46758	0.47862
BSM3045	0.38267	-0.51166	-0.43503	0.25007
B13L5	-0.19651	0.95024	0.15868	-0.08056
B13L10	-0.10963	0.96184	0.12104	-0.06911
B13L15	0.01380	0.87845	0.22488	-0.17852
B13L20	0.59064	0.66489	0.11340	-0.13670
B13L25	0.89467	0.18425	0.06020	-0.25522
B13L35	0.80041	-0.47224	0.17304	-0.08792
B13L40	0.83831	-0.45728	-0.06222	0.11146
B13L45	0.66665	-0.61664	-0.11731	0.12994
B16HHL5	0.51761	0.42139	0.60199	-0.21717
B16HHL10	0.71576	0.28209	0.57901	-0.11474
B16HHL15	0.82281	0.29736	0.46720	-0.04508
B16HHL20	0.82801	-0.05614	0.50119	0.09948
B16HHL25	0.80926	-0.20037	0.51868	0.04243
B16HHL35	0.75141	-0.34915	0.46257	0.10761
B16HHL40	0.76693	-0.37576	0.37586	0.26785
B16HHL45	0.88152	-0.21009	0.29361	0.11498
B16HVL5	-0.10538	0.21309	0.60467	0.30485
B16HVL10	0.54488	0.30512	-0.21835	-0.23751
B16HVL15	0.87023	0.22996	-0.06202	-0.27030
B16HVL20	0.90932	0.08583	-0.00812	-0.18174
B16HVL25	0.95638	-0.01822	-0.07535	-0.22364
B16HVL35	0.94993	-0.02540	-0.05509	-0.23184
B16HVL40	0.94950	-0.03801	-0.05357	-0.01190
B16HVL45	0.88392	0.06407	-0.22814	-0.22788
B75HHL5	-0.33805	0.81597	0.31220	0.30874
B75HHL10	-0.00946	0.82472	0.31186	0.37515
B75HHL15	0.39972	0.65026	0.44798	0.35672
B75HHL20	0.77326	0.32786	0.43098	0.24811
B75HHL25	0.92573	-0.04753	0.33733	0.04282
B75HHL35	0.93355	-0.19619	0.17413	-0.03341
B75HHL40	0.95663	0.09500	-0.06098	-0.12960
B75HHL45	0.95584	-0.12210	-0.17963	-0.02983
B75HVL5	-0.37518	0.27895	0.15994	0.12438
B75HVL10	0.43767	0.61674	-0.42730	-0.11610
B75HVL15	0.55428	0.15481	-0.29095	0.64551
B75HVL20	0.86000	0.08693	-0.40820	0.23727
B75HVL25	0.83243	-0.04156	-0.40484	0.32335
B75HVL35	0.85724	-0.02923	-0.46413	0.07506
B75HVL40	0.83005	0.14762	-0.51129	0.00651
B75HVL45	0.87684	-0.06257	-0.43996	0.14723
BHC	-0.25567	-0.90913	0.26661	0.09836
BVC	-0.28110	-0.91574	0.21783	0.08642
BPRT5	-0.10966	-0.59153	0.49298	0.53719

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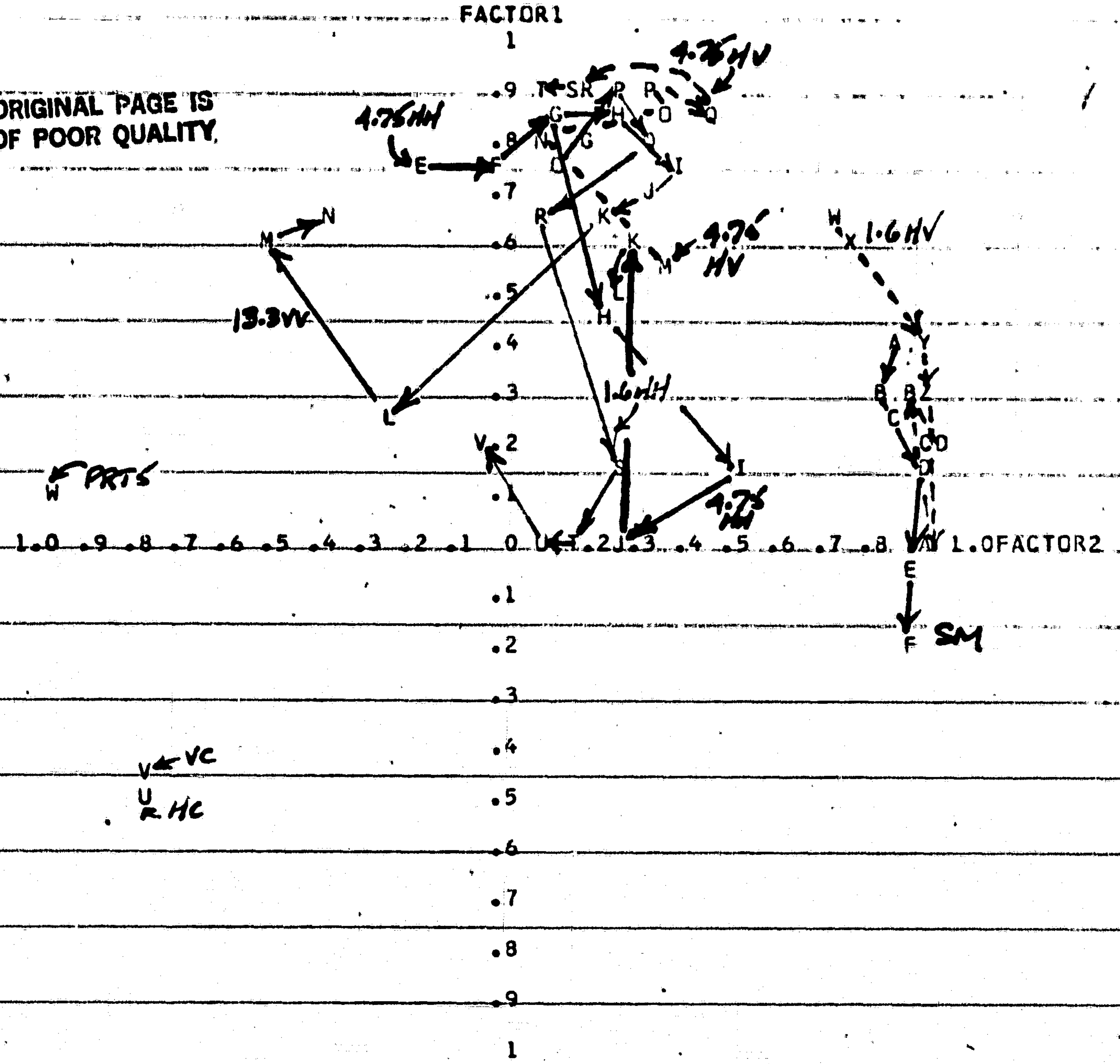
TABLE 35 GUYMON - BARE (Factor BX)

c. EIGENVECTORS

	1	2	3	4
BSM02	0.06582	0.23099	-0.17450	-0.00228
BSM25	0.01387	0.22966	-0.13338	0.05059
BSM59	-0.02796	0.22369	-0.06438	0.21601
BSM915	-0.00867	0.14809	-0.11570	0.39502
BSM1530	0.08216	-0.05359	-0.19562	0.27413
BSM3045	0.08090	-0.15004	-0.18201	0.14323
B13L5	-0.04154	0.27864	0.06639	-0.04614
B13L10	-0.02318	0.28205	0.05064	-0.03958
B13L15	0.00292	0.25759	0.09409	-0.10225
B13L20	0.12486	0.19497	0.04744	-0.07830
B13L25	0.18914	0.05403	0.02519	-0.14618
B13L35	0.16921	-0.13848	0.07240	-0.05036
B13L40	0.17722	-0.13409	-0.02603	0.06384
B13L45	0.14093	-0.18082	-0.04908	0.07443
B16HHL5	0.10942	0.12357	0.25185	-0.12438
B16HHL10	0.15131	0.08272	0.24224	-0.06572
B16HHL15	0.17394	0.08720	0.19547	-0.02582
B16HHL20	0.17504	-0.01646	0.20969	0.05698
B16HHL25	0.17108	-0.05876	0.21700	0.02430
B16HHL35	0.15885	-0.10238	0.19353	0.06164
B16HHL40	0.16213	-0.11019	0.15725	0.15341
B16HHL45	0.18635	-0.06161	0.12284	0.06586
B16HVL5	-0.02228	0.06249	0.25298	0.17461
B16HVL10	0.11519	0.08947	-0.09135	-0.13604
B16HVL15	0.18397	0.06743	-0.02595	-0.15482
B16HVL20	0.19223	0.02517	-0.00340	-0.10410
B16HVL25	0.20218	-0.00534	-0.03153	-0.12810
B16HVL35	0.20082	-0.00745	-0.02305	-0.13279
B16HVL40	0.20073	-0.01114	-0.02241	-0.00682
B16HVL45	0.18686	0.01879	-0.09545	-0.13052
B75HHL5	-0.07146	0.23927	0.13062	0.17683
B75HHL10	-0.00200	0.24184	0.13047	0.21487
B75HHL15	0.08450	0.19068	0.18742	0.20432
B75HHL20	0.16347	0.09614	0.18031	0.14211
B75HHL25	0.19570	-0.01394	0.14113	0.02453
B75HHL35	0.19735	-0.05753	0.07285	-0.01914
B75HHL40	0.20223	0.02786	-0.02551	-0.07423
B75HHL45	0.20207	-0.03580	-0.07515	-0.01709
B75HVL5	-0.07931	0.08180	0.06691	0.07124
B75HVL10	0.09252	0.18085	-0.17877	-0.06650
B75HVL15	0.11717	0.04540	-0.12173	0.36972
B75HVL20	0.18180	0.02549	-0.17078	0.13590
B75HVL25	0.17598	-0.01219	-0.16938	0.18520
B75HVL35	0.18122	-0.00857	-0.19418	0.04299
B75HVL40	0.17547	0.04329	-0.21391	0.00373
B75HVL45	0.18537	-0.01835	-0.18407	0.08433
BHC	-0.05405	-0.26659	0.11154	0.05633
BVC	-0.05942	-0.26853	0.09113	0.04950
BPRT5	-0.02318	-0.17346	0.20625	0.30768

Fig 32 Guymon - Milo. Perp (FactorRX) - Variable Trajectories

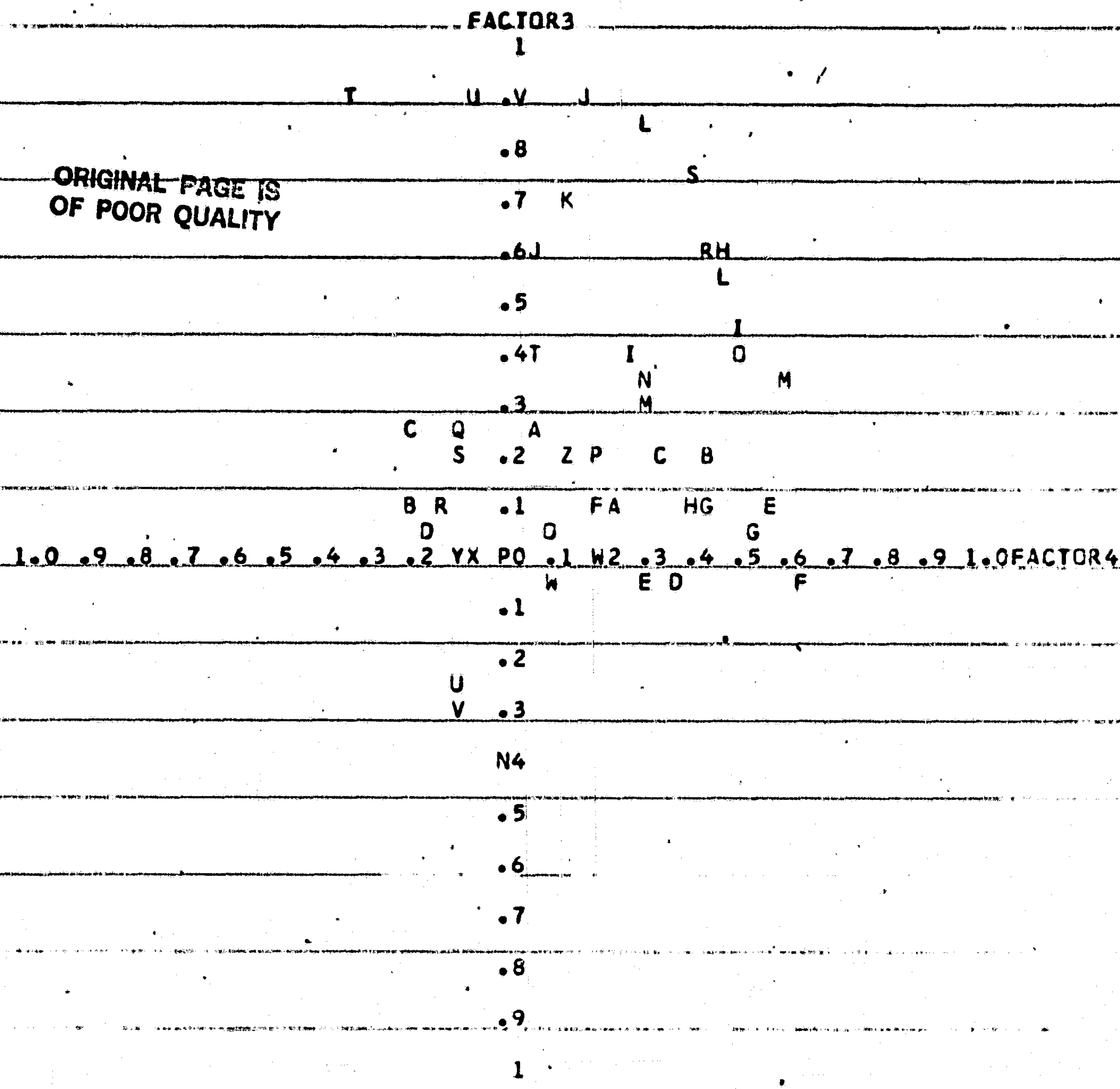
a. PLOT OF FACTOR1 WITH FACTOR2



RSM02 =A	RSM25 =B	RSM59 =C	RSM915 =D	RSM1530 =E
RSM3045 =F	R13L5 =G	R13L10 =H	R13L15 =I	R13L20 =J
R13L25 =K	R13L35 =L	R13L40 =M	R13L45 =N	R16HHL5 =O
R16HHL10=P	R16HHL15=Q	R16HHL20=R	R16HHL25=S	R16HHL35=T
R16HHL40=U	R16HHL45=V	R16HVL5 =W	R16HVL10=X	R16HVL15=Y
R16HVL20=Z	R16HVL25=A	R16HVL35=B	R16HVL40=C	R16HVL45=D
R75HHL5 =E	R75HHL10=F	R75HHL15=G	R75HHL20=H	R75HHL25=I
R75HHL35=J	R75HHL40=K	R75HHL45=L	R75HVL5 =M	R75HVL10=N
R75HVL15=O	R75HVL20=P	R75HVL25=Q	R75HVL35=R	R75HVL40=S
R75HVL45=T	RHC =U	RVC =V	RPRT5 =W	

Fig 32 Guymon - Milo. Perp (Factorrx)

PLOT OF FACTOR3 WITH FACTOR4



RSM02 =A	RSM25 =B	RSM59 =C	RSM915 =D	RSM1530 =E
RSM3045 =F	R13L5 =G	R13L10 =H	R13L15 =I	R13L20 =J
R13L25 =J	R13L35 =L	R13L40 =M	R13L45 =N	R16HHL5 =O
R16HHL10=P	R16HHL15=Q	R16HHL20=R	R16HHL25=S	R16HHL35=T
R16HHL40=U	R16HHL45=V	R16HVL5 =W	R16HVL10=X	R16HVL15=Y
R16HVL20=Z	R16HVL25=A	R16HVL35=B	R16HVL40=C	R16HVL45=D
R75HHL5 =E	R75HHL10=F	R75HHL15=G	R75HHL20=H	R75HHL25=I
R75HHL35=J	R75HHL40=J	R75HHL45=L	R75HVL5 =M	R75HVL10=N
R75HVL15=O	R75HVL20=P	R75HVL25=Q	R75HVL35=R	R75HVL40=S
R75HVL45=T	RHC =U	RVC =V	RPRT5 =W	

TABLE 36 GUYMON - MILO. PERD (FACTORRX)

a. ROTATED FACTOR PATTERN

		FACTOR1	FACTOR2	FACTOR3	FACTOR4
A	RSM02	0.38760	0.86035	0.10577	0.23238
B	RSM25	0.28334	0.81439	0.21224	0.41563
C	RSM59	0.27239	0.84385	0.18239	0.32098
D	RSM915	0.17461	0.90873	-0.02656	0.33527
E	RSM1530	-0.06057	0.87374	-0.04386	0.27427
F	RSM3045	-0.18299	0.87724	0.09150	0.16683
G	R13L5	0.85788	0.12298	0.11021	0.40396
H	R13L10	0.85712	0.25315	0.11306	0.39128
I	R13L15	0.76464	0.39838	0.40404	0.24896
J	R13L20	0.67924	0.31216	0.59046	0.06020
K	R13L25	0.65546	0.20955	0.61250	0.03813
L	R13L35	0.26739	-0.23373	0.86316	0.27638
M	R13L40	0.60764	-0.53101	0.29454	0.27398
N	R13L45	0.65443	-0.38272	-0.41969	-0.02006
O	R16HHL5	0.73426	0.11003	0.40185	0.48083
P	R16HHL10	0.92255	0.25476	0.18030	0.19403
Q	R16HHL15	0.80721	0.32751	0.23727	-0.11806
R	R16HHL20	0.65357	0.07737	0.59339	0.40525
S	R16HHL25	0.14329	0.25777	0.76858	0.38216
T	R16HHL35	0.00593	0.16590	0.88151	-0.34881
U	R16HHL40	0.00551	0.08793	0.91818	-0.09726
V	R16HHL45	0.19978	-0.06509	0.91337	0.01181
W	R16HVL5	0.66582	0.71992	-0.03555	0.09821
X	R16HVL10	0.61175	0.76436	-0.01849	-0.07885
Y	R16HVL15	0.38804	0.90766	-0.01501	-0.10292
Z	R16HVL20	0.29737	0.90955	0.19910	0.12953
A	R16HVL25	-0.01374	0.91757	0.25702	0.05249
B	R16HVL35	0.29733	0.89625	0.09883	-0.23231
C	R16HVL40	0.20885	0.90201	0.23095	-0.22455
D	R16HVL45	0.20588	0.94913	0.07257	-0.18911
E	R75HHL5	0.73670	-0.17066	0.08652	0.53925
F	R75HHL10	0.73767	-0.00570	-0.05312	0.62995
G	R75HHL15	0.78016	0.18831	0.03247	0.51116
H	R75HHL20	0.47375	0.22487	0.58930	0.45432
I	R75HHL25	0.16093	0.51793	0.43174	0.49153
J	R75HHL35	0.02007	0.24735	0.92150	0.14696
K	R75HHL40	0.57524	0.29516	0.72250	0.10168
L	R75HHL45	0.50473	0.24106	0.55130	0.46352
M	R75HVL5	0.54332	0.36442	0.37485	0.57062
N	R75HVL10	0.78651	0.08704	0.35968	0.27577
O	R75HVL15	0.86050	0.35526	0.05091	0.09146
P	R75HVL20	0.91846	0.33053	0.02020	-0.02433
Q	R75HVL25	0.82867	0.46556	0.05120	0.08224
R	R75HVL35	0.91381	0.18370	0.11137	-0.15026
S	R75HVL40	0.91790	0.14594	0.18438	-0.10334
T	R75HVL45	0.88586	0.08573	0.37608	0.05520
U	RHC	-0.48165	-0.77958	-0.24884	-0.11068
V	RVC	-0.44797	-0.77449	-0.32228	-0.13166
W	RPRT5	0.08418	-0.96689	-0.02391	0.17091

ORTHOGONAL TRANSFORMATION MATRIX

	1	2	3	4
1	0.69591	0.57135	0.36853	0.23120
2	0.49713	-0.81889	0.20478	0.20088
3	-0.44529	-0.04207	0.89420	0.01894
4	-0.26511	0.03488	-0.15054	0.95175

TABLE 36 GUYMON - MILO. PERP (FACTOR RX)

b. FACTOR PATTERN

	FACTOR1	FACTOR2	FACTOR3	FACTOR4
RSM02	0.85400	-0.44350	-0.10980	0.13250
RSM25	0.83679	-0.39909	0.03723	0.31692
RSM59	0.81312	-0.45377	0.01239	0.23526
RSM915	0.70844	-0.59544	-0.13338	0.30850
RSM1530	0.50430	-0.69949	-0.04381	0.31417
RSM3045	0.44616	-0.75708	0.12956	0.22412
R13L5	0.80128	0.42949	-0.28098	0.14473
R13L10	0.87325	0.32055	-0.28380	0.13698
R13L15	0.96620	0.18665	0.00876	-0.01270
R13L20	0.88256	0.21506	0.21354	-0.20078
R13L25	0.81041	0.28734	0.24774	-0.22238
R13L35	0.43454	0.55660	0.66784	0.05406
R13L40	0.29137	0.85226	0.02033	0.03680
R13L45	0.07746	0.54877	-0.65098	-0.14276
R16HHL5	0.83311	0.45380	0.03686	0.20631
R16HHL10	0.89888	0.32591	-0.25661	-0.07817
R16HHL15	0.80901	0.15797	-0.16329	-0.35066
R16HHL20	0.81141	0.46447	0.24401	0.12580
R16HHL25	0.61859	0.09431	0.61985	0.21902
R16HHL35	0.34312	-0.02246	0.77202	-0.46047
R16HHL40	0.36995	0.09922	0.81304	-0.22918
R16HHL45	0.44117	0.34203	0.73073	-0.18150
R16HVL5	0.88429	-0.24609	-0.35669	-0.05259
R16HVL10	0.83740	-0.34143	-0.32259	-0.20779
R16HVL15	0.75931	-0.57411	-0.22634	-0.16691
R16HVL20	0.82994	-0.53019	0.00981	0.04619
R16HVL25	0.62155	-0.69504	0.19834	0.04692
R16HVL35	0.70170	-0.61255	-0.08613	-0.28354
R16HVL40	0.69390	-0.63263	0.07132	-0.27239
R16HVL45	0.66858	-0.69800	-0.07029	-0.21238
R75HHL5	0.57174	0.63203	-0.23328	0.29894
R75HHL10	0.63617	0.48705	-0.36380	0.41179
R75HHL15	0.78066	0.34297	-0.31660	0.28134
R75HHL20	0.78039	0.26331	0.31514	0.22593
R75HHL25	0.68067	-0.15698	0.30193	0.37822
R75HHL35	0.52886	0.02565	0.80745	0.00446
R75HHL40	0.85873	0.21265	0.37942	-0.15420
R75HHL45	0.79931	0.25952	0.26687	-0.23276
R75HVL5	0.85638	0.16307	0.08873	0.35533
R75HVL10	0.79338	0.44877	-0.02703	0.00284
R75HVL15	0.84172	0.16566	-0.35086	-0.13635
R75HVL20	0.82984	0.18518	-0.40528	-0.25817
R75HVL25	0.88056	0.05772	-0.34124	-0.13289
R75HVL35	0.74719	0.29648	-0.31790	-0.39563
R75HVL40	0.76622	0.35381	-0.25195	-0.36437
R75HVL45	0.81682	0.45829	-0.06073	-0.23594
RHC	-0.89790	0.32575	0.02266	0.03262
RVC	-0.90347	0.31907	-0.05862	0.01496
RPRT5	-0.46315	0.86305	-0.01495	0.11022

TABLE 36 GUYMON-MILO. PERP (FACTORRX)

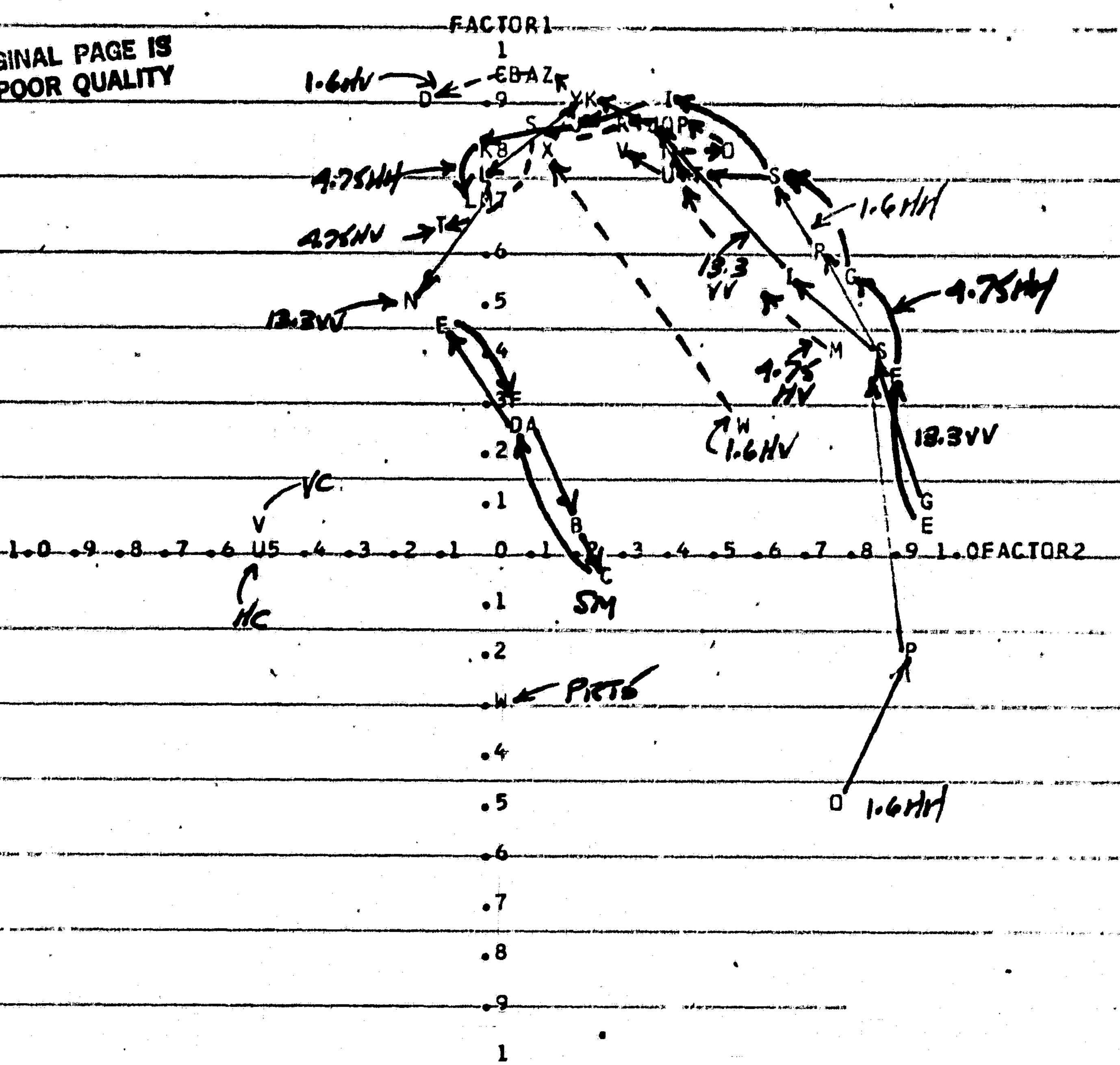
ORIGINAL PAGE IS OF POOR QUALITY

C. EIGENVECTORS

	1	2	3	4
RSM02	0.16572	-0.14299	-0.04566	0.08249
RSM25	0.16238	-0.12867	0.01548	0.19729
RSM59	0.15779	-0.14630	0.00515	0.14646
RSM915	0.13747	-0.19198	-0.05546	0.19206
RSM1530	0.09786	-0.22552	-0.01822	0.19559
RSM3045	0.08658	-0.24409	0.05387	0.13953
R13L5	0.15549	0.13847	-0.11683	0.09010
R13L10	0.16945	0.10335	-0.11800	0.08528
R13L15	0.18749	0.06018	0.00364	-0.00790
R13L20	0.17126	0.06934	0.08879	-0.12500
R13L25	0.15726	0.09264	0.10301	-0.13844
R13L35	0.08432	0.17945	0.27768	0.03366
R13L40	0.05654	0.27478	0.00845	0.02291
R13L45	0.01503	0.17693	-0.27067	-0.08888
R16HHL5	0.16167	0.14631	0.01532	0.12844
R16HHL10	0.17443	0.10508	-0.10670	-0.04866
R16HHL15	0.15699	0.05093	-0.06790	-0.21830
R16HHL20	0.15745	0.14975	0.10146	0.07831
R16HHL25	0.12004	0.03041	0.25773	0.13635
R16HHL35	0.06658	-0.00724	0.32100	-0.28666
R16HHL40	0.07179	0.03199	0.33805	-0.14268
R16HHL45	0.08561	0.11028	0.30383	-0.11299
R16HVL5	0.17160	-0.07934	-0.14831	-0.03274
R16HVL10	0.16250	-0.11008	-0.13413	-0.12936
R16HVL15	0.14734	-0.18510	-0.09411	-0.10391
R16HVL20	0.16105	-0.17094	0.00408	0.02876
R16HVL25	0.12061	-0.22409	0.08247	0.02921
R16HVL35	0.13617	-0.19749	-0.03581	-0.17652
R16HVL40	0.13465	-0.20397	0.02965	-0.16958
R16HVL45	0.12974	-0.22504	-0.02923	-0.13222
R75HHL5	0.11095	0.20377	-0.09700	0.18611
R75HHL10	0.12345	0.15703	-0.15127	0.25636
R75HHL15	0.15149	0.11058	-0.13164	0.17515
R75HHL20	0.15143	0.08489	0.13103	0.14065
R75HHL25	0.13208	-0.05061	0.12554	0.23546
R75HHL35	0.10263	0.00827	0.33573	0.00277
R75HHL40	0.16664	0.06856	0.15776	-0.09599
R75HHL45	0.15511	0.08367	0.11096	0.14490
R75HVL5	0.16618	0.05258	0.03689	0.22121
R75HVL10	0.15396	0.14469	-0.01124	0.00177
R75HVL15	0.16334	0.05341	-0.14588	-0.08489
R75HVL20	0.16103	0.05970	-0.16851	-0.16072
R75HVL25	0.17087	0.01861	-0.14188	-0.08273
R75HVL35	0.14499	0.09559	-0.13218	-0.24630
R75HVL40	0.14869	0.11407	-0.10476	-0.22684
R75HVL45	0.15850	0.14776	-0.02525	-0.14689
RHC	-0.17424	0.10503	0.00942	0.02031
RVC	-0.17532	0.10287	-0.02437	0.00931
RPRT5	-0.08987	0.27826	-0.00622	0.06862

Fig 33 Guymon - Milo. Par (Factor Lx) - Variable Trajectories

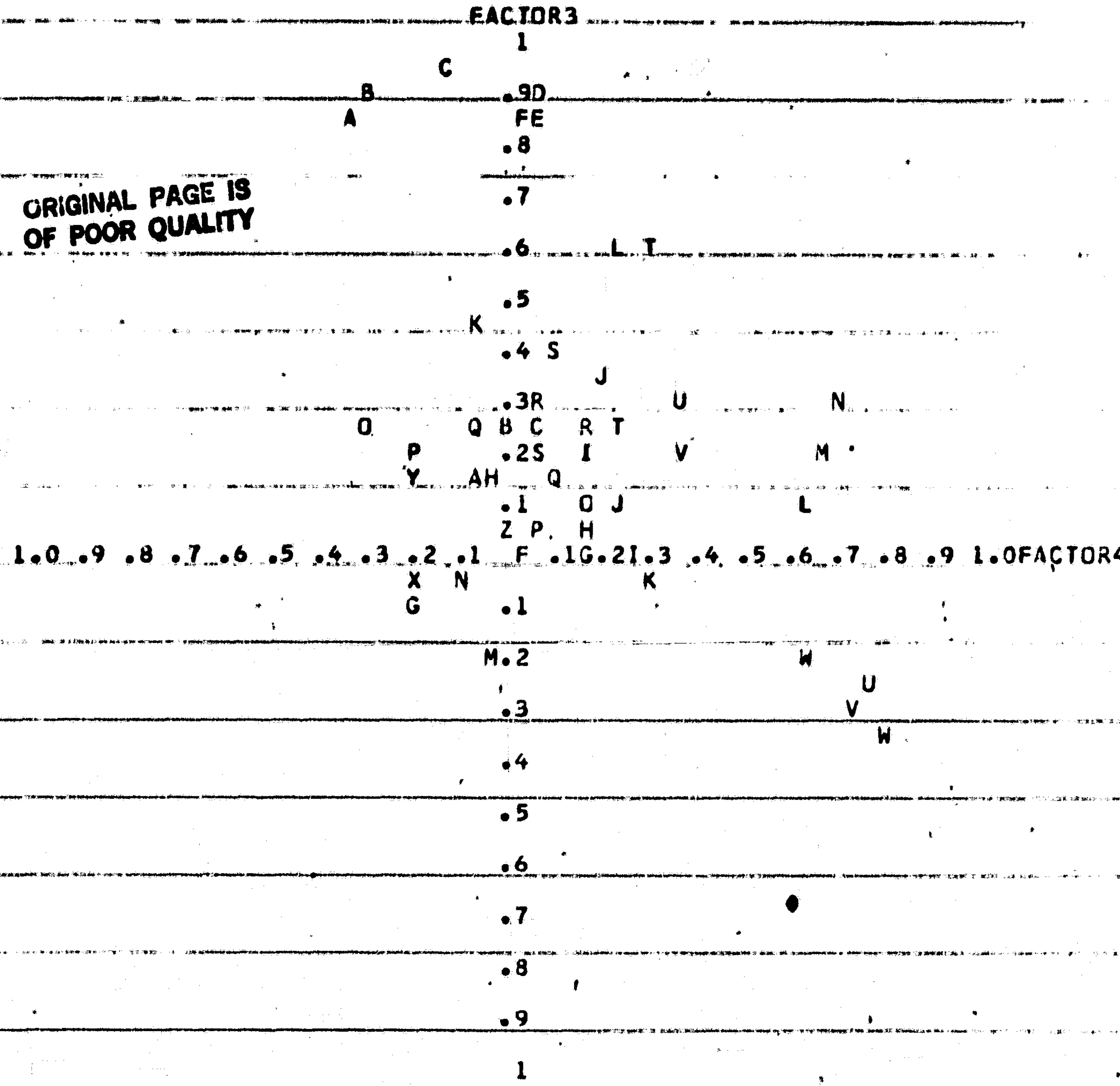
a. PLOT OF FACTOR1 WITH FACTOR2



LSM02 =A	LSM25 =B	LSM59 =C	LSM915 =D	LSM1530 =E
LSM3045 =F	L13L5 =G	L13L10 =S	L13L15 =I	L13L20 =J
L13L25 =K	L13L35 =L	L13L40 =M	L13L45 =N	L16HHL5 =O
L16HHL10=P	L16HHL15=S	L16HHL20=R	L16HHL25=S	L16HHL35=T
L16HHL40=U	L16HHL45=V	L16HVL5 =W	L16HVL10=X	L16HVL15=Y
L16HVL20=Z	L16HVL25=A	L16HVL35=B	L16HVL40=C	L16HVL45=D
L75HHL5 =E	L75HHL10=F	L75HHL15=G	L75HHL20=S	L75HHL25=I
L75HHL35=J	L75HHL40=K	L75HHL45=L	L75HVL5 =M	L75HVL10=N
L75HVL15=O	L75HVL20=P	L75HVL25=S	L75HVL35=R	L75HVL40=S
L75HVL45=T	LHC =U	LVC =V	LPLT5 =W	

Fig 33 Guymon - Milo. Par (Factor Lx)

b. PLOT OF FACTOR3 WITH FACTOR4



LSM02 =A	LSM25 =B	LSM59 =C	LSM915 =C	LSM1530 =Z
LSM3045 =F	L13L5 =G	L13L10 =H	L13L15 =I	L13L20 =J
L13L25 =K	L13L35 =L	L13L40 =M	L13L45 =N	L16HHL5 =O
L16HHL10=P	L16HHL15=Q	L16HHL20=R	L16HHL25=S	L16HHL35=T
L16HHL40=U	L16HHL45=V	L16HVL5 =W	L16HVL10=X	L16HVL15=Y
L16HVL20=Z	L16HVL25=A	L16HVL35=B	L16HVL40=C	L16HVL45=C
L75HHL5 =Z	L75HHL10=F	L75HHL15=G	L75HHL20=H	L75HHL25=I
L75HHL35=J	L75HHL40=K	L75HHL45=L	L75HVL5 =M	L75HVL10=N
L75HVL15=O	L75HVL20=P	L75HVL25=Q	L75HVL35=R	L75HVL40=S
L75HVL45=T	LHC =U	LVC =V	LPLT5 =W	

TABLE 37 GUYMON - MILO. PAR (FACTOR LX)

ORIGINAL PAGE IS OF POOR QUALITY

a. ROTATED FACTOR PATTERN

		FACTOR1	FACTOR2	FACTOR3	FACTOR4
A	LSM02	0.25766	0.07958	0.85395	-0.36154
B	LSM25	0.03768	0.18526	0.90775	-0.32778
C	LSM59	-0.03337	0.24521	0.93976	-0.13614
D	LSM915	0.24619	0.05755	0.91084	0.03347
E	LSM1530	0.44246	-0.10405	0.82688	0.06463
F	LSM3045	0.28997	0.05697	0.86129	0.03211
G	L13L5	0.09145	0.95211	-0.09853	-0.22835
S	L13L10	0.42398	0.83501	0.13742	-0.06665
I	L13L15	0.57300	0.63539	-0.01100	0.23619
J	L13L20	0.84131	0.35941	0.09265	0.20262
K	L13L25	0.88827	0.20166	-0.05070	0.28998
L	L13L35	0.74536	-0.00798	0.09270	0.62935
M	L13L40	0.68107	-0.01171	0.21393	0.64018
N	L13L45	0.50963	-0.18896	0.31669	0.66992
O	L16HHL5	-0.49136	0.75345	0.22745	-0.31433
P	L16HHL10	-0.20652	0.90921	0.21035	-0.21317
S	L16HHL15	0.42376	0.83746	0.24401	-0.09263
R	L16HHL20	0.60762	0.70747	0.29436	0.03982
S	L16HHL25	0.73035	0.60305	0.21806	0.04877
T	L16HHL35	0.77324	0.46469	0.26506	0.21870
U	L16HHL40	0.74092	0.37714	0.30165	0.35953
V	L16HHL45	0.81149	0.26969	0.22386	0.34896
W	L16HVL5	0.24596	0.54147	-0.19692	0.61824
X	L16HVL10	0.80012	0.12963	-0.03950	-0.20788
Y	L16HVL15	0.90183	0.18434	0.12605	-0.20778
Z	L16HVL20	0.93224	0.10142	0.05316	-0.00408
A	L16HVL25	0.94915	0.08692	0.15087	-0.07156
B	L16HVL35	0.94611	0.05054	0.23479	-0.03174
C	L16HVL40	0.94706	0.02484	0.25932	0.05839
D	L16HVL45	0.90990	-0.14594	0.24912	0.04552
E	L75HHL5	0.04127	0.96448	0.05784	-0.01477
F	L75HHL10	0.32728	0.89870	-0.02339	0.01723
G	L75HHL15	0.54092	0.79773	0.01572	0.14910
S	L75HHL20	0.75107	0.60898	0.03840	0.13499
I	L75HHL25	0.87895	0.38282	0.19431	0.15619
J	L75HHL35	0.86227	0.17204	0.36222	0.17615
K	L75HHL40	0.81658	-0.00500	0.45386	-0.07227
L	L75HHL45	0.68394	-0.05600	0.61459	0.21270
M	L75HVL5	0.41910	0.74399	-0.21586	-0.06498
N	L75HVL10	0.80235	0.37505	-0.07355	-0.13016
O	L75HVL15	0.78009	0.50658	0.11056	0.13335
P	L75HVL20	0.86264	0.40935	0.07358	0.03785
S	L75HVL25	0.85761	0.39582	0.13778	0.09952
R	L75HVL35	0.86553	0.28707	0.24949	0.15068
S	L75HVL40	0.83849	0.08668	0.38409	0.09631
T	L75HVL45	0.66682	-0.10162	0.57551	0.26846
U	LHC	0.01075	-0.52126	-0.26918	0.73801
V	LVC	0.03045	-0.52748	-0.28869	0.71502
W	LPLT5	-0.29289	0.01043	-0.32582	0.79712

ORTHOGONAL TRANSFORMATION MATRIX

	1	2	3	4
1	0.86011	0.40229	0.29293	0.11210
2	-0.33331	0.84967	-0.03233	-0.40733
3	0.12773	0.22893	-0.85829	0.44114
4	-0.36442	0.25260	0.42010	0.79178

ORIGINAL PAGE IS
OF POOR QUALITY

TABLE 37 GUYMON.PAR (FACTORLX)

b. FACTOR PATTERN

	FACTOR1	FACTOR2	FACTOR3	FACTOR4
LSM02	0.46325	0.10140	-0.84130	-0.00131
LSM25	0.33610	0.24902	-0.87648	0.15488
LSM59	0.32996	0.24454	-0.81477	0.36111
LSM915	0.50546	-0.07624	-0.72238	0.33397
LSM1530	0.58817	-0.28895	-0.64850	0.21102
LSM3045	0.52822	-0.08917	-0.67499	0.29598
L13L5	0.40722	0.87469	0.21348	-0.01502
L13L10	0.73337	0.59087	0.09797	0.06138
L13L15	0.77171	0.25303	0.33228	0.13408
L13L20	0.91806	-0.06057	0.19961	-0.01645
L13L25	0.86280	-0.24121	0.33107	-0.06446
L13L35	0.73558	-0.51456	0.29145	0.26361
L13L40	0.71552	-0.50463	0.18311	0.34560
L13L45	0.53019	-0.61353	0.04556	0.43001
L16HHL5	-0.08812	0.92464	-0.22415	0.21605
L16HHL10	0.22585	0.92139	-0.09281	0.22451
L16HHL15	0.76248	0.60016	-0.00444	0.08629
L16HHL20	0.89792	0.37285	0.00449	0.11247
L16HHL25	0.94012	0.24204	0.06570	0.01640
L16HHL35	0.95417	0.03945	0.07413	0.12011
L16HHL40	0.91766	-0.08271	0.08068	0.23665
L16HHL45	0.91116	-0.19071	0.12720	0.14275
L16HVL5	0.44100	0.13263	0.59713	0.45393
L16HVL10	0.70547	-0.07059	0.07407	-0.44002
L16HVL15	0.86346	-0.06340	-0.04245	-0.39364
L16HVL20	0.85774	-0.22461	0.09487	-0.29501
L16HVL25	0.88751	-0.21824	-0.01993	-0.31721
L16HVL35	0.89930	-0.26707	-0.08310	-0.25850
L16HVL40	0.90708	-0.32673	-0.07016	-0.18368
L16HVL45	0.80198	-0.45388	-0.11092	-0.22775
L75HHL5	0.43878	0.80988	0.16991	0.24120
L75HHL10	0.63812	0.64825	0.27522	0.11157
L75HHL15	0.80749	0.43627	0.30400	0.12904
L75HHL20	0.91737	0.21086	0.26194	0.00314
L75HHL25	0.98443	-0.03760	0.10203	-0.01831
L75HHL35	0.93671	-0.22469	-0.08366	0.02087
L75HHL40	0.82519	-0.26166	-0.31827	-0.16539
L75HHL45	0.76961	-0.38205	-0.35912	0.16321
L75HVL5	0.58926	0.52590	0.38046	-0.10693
L75HVL10	0.80485	0.10663	0.19405	-0.33161
L75HVL15	0.92209	0.11252	0.17955	-0.00428
L75HVL20	0.93244	0.04249	0.15744	-0.15008
L75HVL25	0.94839	0.00548	0.12580	-0.07586
L75HVL35	0.94991	-0.11402	0.02861	-0.01879
L75HVL40	0.87937	-0.25747	-0.16022	-0.04605
L75HVL45	0.73133	-0.43656	-0.31361	0.18566
LHC	-0.19657	-0.73839	0.43864	0.33567
LVC	-0.19042	-0.74024	0.44634	0.30052
LPLT5	-0.25380	-0.20767	0.59627	0.60363

TABLE 37 GUYMON-MILO. PAIR (FACTOR LX)

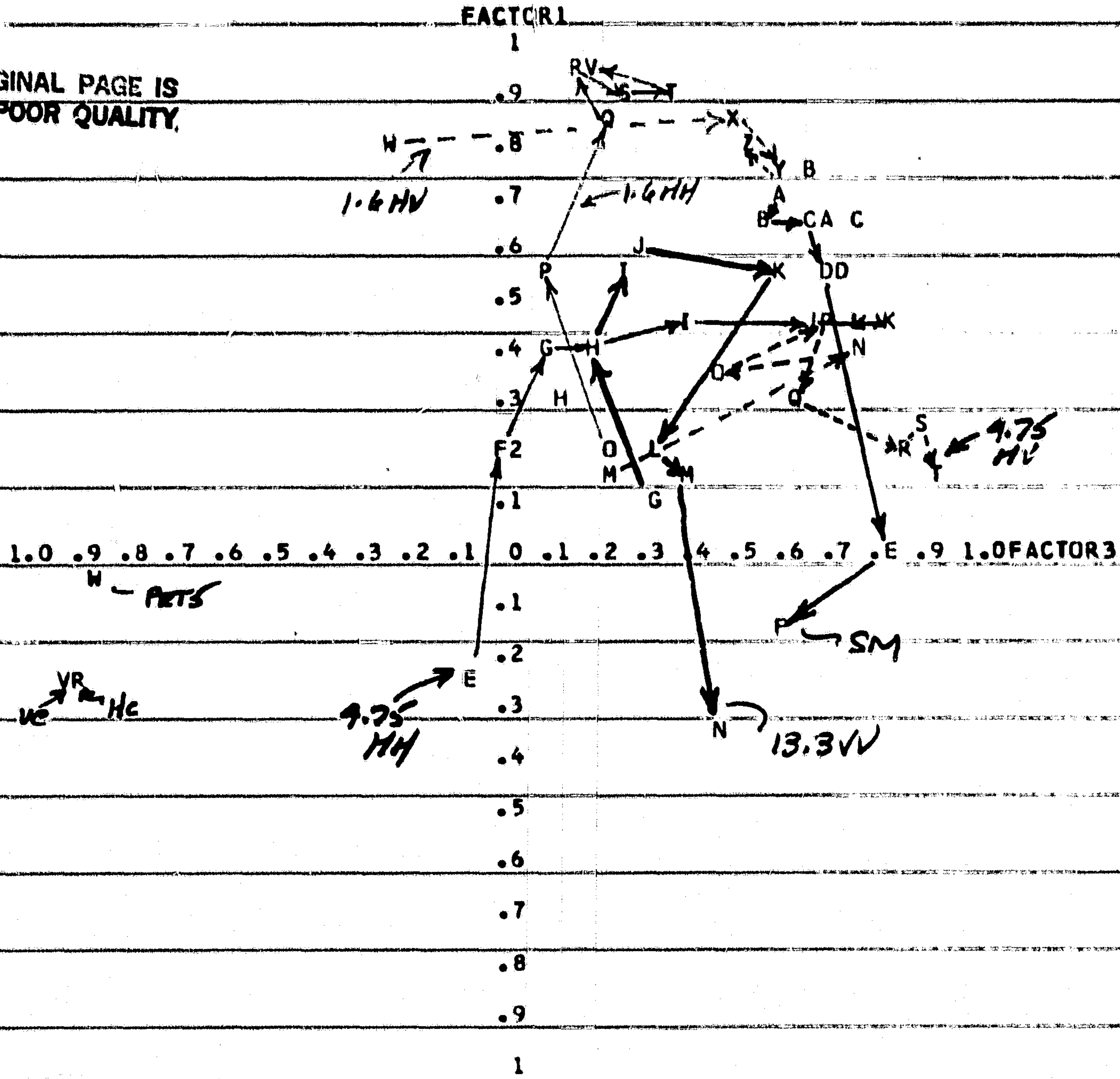
ORIGINAL PAGE IS OF POOR QUALITY

C. EIGENVECTORS

	1	2	3	4
LSM02	0.08938	0.03485	-0.34055	-0.00078
LSM25	0.06485	0.08558	-0.35480	0.09260
LSM59	0.06366	0.08404	-0.32982	0.21591
LSM915	0.09752	-0.02620	-0.29242	0.19968
LSM1530	0.11349	-0.09930	-0.26251	0.12617
LSM3045	0.10191	-0.03065	-0.27323	0.17697
L13L5	0.07857	0.30061	0.08641	-0.00898
L13L10	0.14150	0.20307	0.03966	0.03670
L13L15	0.14889	0.08696	0.13451	0.08017
L13L20	0.17713	-0.02082	0.08080	-0.00983
L13L25	0.16647	-0.08290	0.13401	-0.03854
L13L35	0.14192	-0.17684	0.11798	0.15762
L13L40	0.13805	-0.17343	0.07412	0.20663
L13L45	0.10229	-0.21086	0.01844	0.25711
L16HHL5	-0.01700	0.31778	-0.09074	0.12918
L16HHL10	0.04358	0.31666	-0.03757	0.13423
L16HHL15	0.14711	0.20626	-0.00180	0.05159
L16HHL20	0.17324	0.12814	0.00182	0.06725
L16HHL25	0.18139	0.08318	0.02659	0.00981
L16HHL35	0.18410	0.01356	0.03001	0.07182
L16HHL40	0.17705	-0.02843	0.03266	0.14149
L16HHL45	0.17580	-0.06554	0.05149	0.08535
L16HVL5	0.08509	0.04558	0.24171	0.27141
L16HVL10	0.13611	-0.02426	0.02998	-0.26309
L16HVL15	0.16660	-0.02179	-0.01719	-0.23536
L16HVL20	0.16549	-0.07719	0.03840	-0.17639
L16HVL25	0.17124	-0.07500	-0.00807	-0.18966
L16HVL35	0.17351	-0.09179	-0.03364	-0.15456
L16HVL40	0.17501	-0.11229	-0.02840	-0.10982
L16HVL45	0.15473	-0.15599	-0.04490	-0.13617
L75HHL5	0.08466	0.27834	0.06878	0.14421
L75HHL10	0.12312	0.22279	0.11141	0.06671
L75HHL15	0.15580	0.14994	0.12306	0.07715
L75HHL20	0.17700	0.07247	0.10603	0.00188
L75HHL25	0.18993	-0.01292	0.04130	-0.01095
L75HHL35	0.18073	-0.07722	-0.03387	0.01248
L75HHL40	0.15921	-0.08993	-0.12883	-0.09889
L75HHL45	0.14849	-0.13130	-0.14537	0.09758
L75HVL5	0.11369	0.18074	0.15401	-0.06393
L75HVL10	0.15529	0.03665	0.07855	-0.19827
L75HVL15	0.17791	0.03867	0.07268	-0.00256
L75HVL20	0.17990	0.01460	0.06373	-0.08973
L75HVL25	0.18298	0.00188	0.05092	-0.04536
L75HVL35	0.18327	-0.03919	0.01158	-0.01123
L75HVL40	0.16966	-0.08849	-0.06486	-0.02754
L75HVL45	0.14110	-0.15003	-0.12695	0.11101
LHC	-0.03793	-0.25377	0.17756	0.20070
LVC	-0.03674	-0.25440	0.18068	0.17968
LPLT5	-0.04897	-0.07137	0.24137	0.36091

Fig 34 GUYMON. ALF (FACTOR AX) - VARIABLE TRAJECTORIES

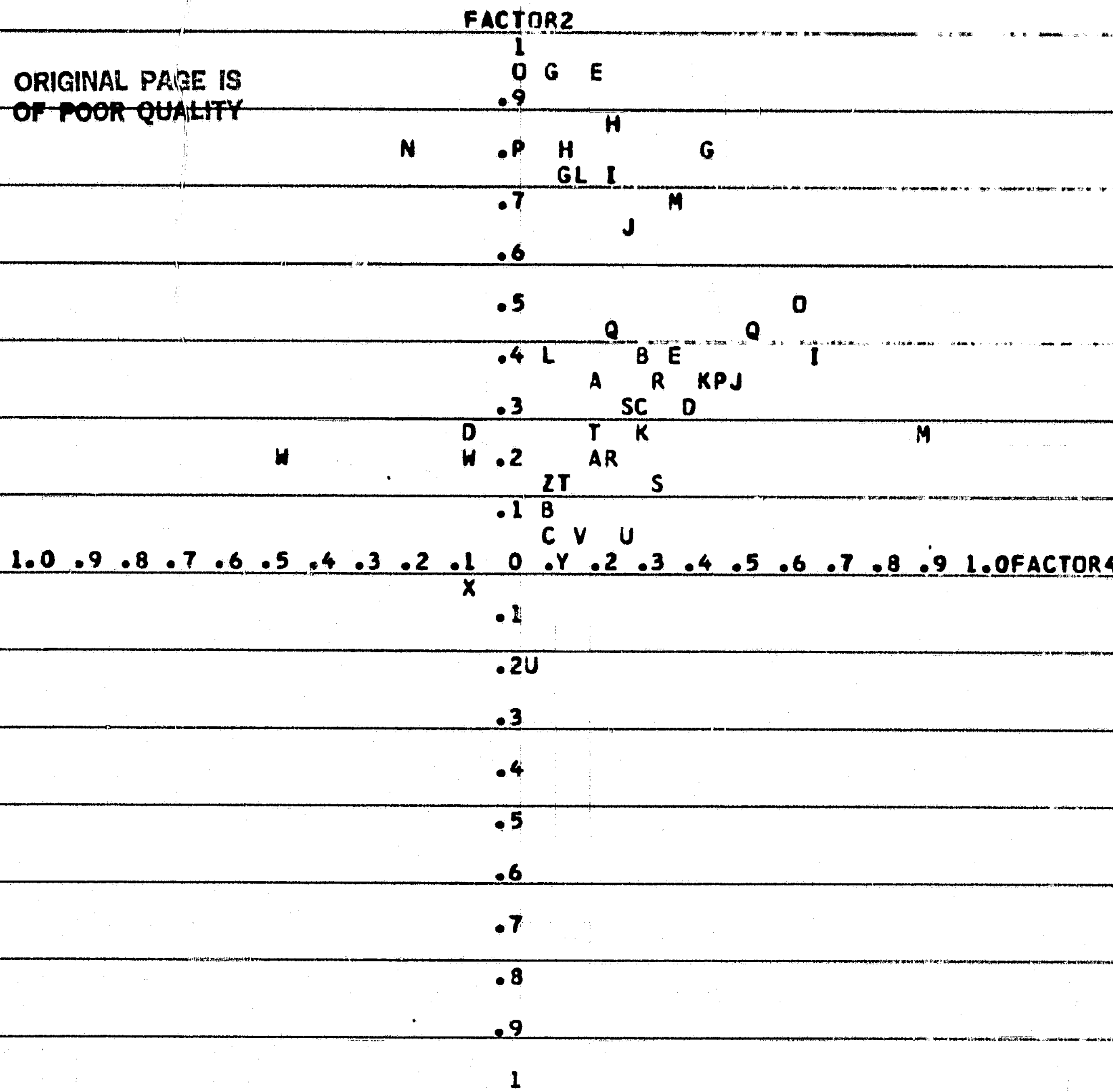
a. PLOT OF FACTOR1 WITH FACTOR3



ASM02 =A	ASM25 =B	ASM59 =C	ASM915 =D	ASM1530 =E
ASM3045 =F	A13L5 =G	A13L10 =H	A13L15 =I	A13L20 =J
A13L25 =K	A13L35 =L	A13L40 =M	A13L45 =N	A16HHL5 =O
A16HHL10=P	A16HHL15=Q	A16HHL20=R	A16HHL25=S	A16HHL35=T
A16HHL40=R	A16HHL45=V	A16HVL5 =W	A16HVL10=X	A16HVL15=Y
A16HVL20=Z	A16HVL25=A	A16HVL35=B	A16[illegible]40=C	A16HVL45=D
A75HHL5 =E	A75HHL10=F	A75HHL15=G	A75HHL20=H	A75HHL25=I
A75HHL35=J	A75HHL40=K	A75HHL45=L	A75HVL5 =M	A75HVL10=N
A75HVL15=O	A75HVL20=P	A75HVL25=Q	A75HVL35=R	A75HVL40=S
A75HVL45=T	AHC =R	AVC =V	APRT5 =W	

Fig 34 Guymon Alf (Factor Bx)

b. PLOT OF FACTOR2 WITH FACTOR4



ASM02 =A	ASM25 =B	ASM59 =C	ASM915 =D	ASM1530 =E
ASM3045 =G	A13L5 =G	A13L10 =H	A13L15 =I	A13L20 =J
A13L25 =K	A13L35 =L	A13L40 =M	A13L45 =A	A16HHL5 =O
A16HHL10=P	A16HHL15=Q	A16HHL20=R	A16HHL25=S	A16HHL35=T
A16HHL40=U	A16HHL45=U	A16HVL5 =W	A16HVL10=X	A16HVL15=Y
A16HVL20=Z	A16HVL25=A	A16HVL35=B	A16HVL40=C	A16HVL45=D
A75HHL5 =E	A75HHL10=G	A75HHL15=G	A75HHL20=H	A75HHL25=I
A75HHL35=J	A75HHL40=K	A75HHL45=L	A75HVL5 =M	A75HVL10=A
A75HVL15=O	A75HVL20=P	A75HVL25=Q	A75HVL35=R	A75HVL40=S
A75HVL45=T	AHC =U	AVC =U	APRT5 =W	

TABLE 38 GUYMON. ALF (FACTOR Ax)

a. ROTATED FACTOR PATTERN

		FACTOR1	FACTOR2	FACTOR3	FACTOR4
A	ASM02	0.70801	0.33819	0.57985	0.19910
B	ASM25	0.67437	0.42006	0.54455	0.26778
C	ASM59	0.62557	0.30310	0.65249	0.29356
D	ASM915	0.54756	0.32268	0.67596	0.36753
E	ASM1530	-0.01461	0.41257	0.81059	0.33601
F	ASM3045	-0.17142	0.75272	0.59216	0.10958
G	A13L5	0.11701	0.92811	0.33223	0.07235
H	A13L10	0.31471	0.80368	0.12841	0.12581
I	A13L15	0.55159	0.73036	0.25505	0.21066
J	A13L20	0.58150	0.62879	0.29883	0.26416
K	A13L25	0.56724	0.33546	0.59442	0.41605
L	A13L35	0.18657	0.77014	0.33118	0.14029
M	A13L40	0.14105	0.70532	0.36881	0.33582
N	A13L45	-0.32973	0.78151	0.43662	-0.22074
O	A16HHL5	0.19441	0.94590	0.20583	0.00468
P	A16HHL10	0.55569	0.82382	0.07433	0.01865
Q	A16HHL15	0.83938	0.42925	0.22673	0.23293
R	A16HHL20	0.92698	0.21423	0.14386	0.22876
S	A16HHL25	0.87993	0.31162	0.24615	0.24990
T	A16HHL35	0.92054	0.13862	0.34334	0.10052
U	A16HHL40	0.96040	0.04688	0.13996	0.23629
V	A16HHL45	0.94465	0.06738	0.16919	0.14864
W	A16HVL5	0.79104	0.17991	-0.23464	-0.47785
X	A16HVL10	0.85631	-0.05447	0.49904	-0.09174
Y	A16HVL15	0.75913	0.00348	0.59896	0.12558
Z	A16HVL20	0.81798	0.16238	0.52276	0.06907
A	A16HVL25	0.66911	0.22410	0.68194	0.19233
B	A16HVL35	0.73736	0.09013	0.65967	0.09905
C	A16HVL40	0.66016	0.07286	0.74340	0.06674
D	A16HVL45	0.57415	0.23879	0.72899	-0.08714
E	A75HHL5	-0.23048	0.93279	-0.08462	0.18535
F	A75HHL10	0.17570	0.96007	-0.02056	0.07513
G	A75HHL15	0.37705	0.81557	0.08469	0.41628
H	A75HHL20	0.40393	0.84349	0.17525	0.20871
I	A75HHL25	0.46983	0.37867	0.37532	0.65459
J	A75HHL35	0.43587	0.36554	0.64644	0.49023
K	A75HHL40	0.43582	0.27473	0.80144	0.27127
L	A75HHL45	0.43622	0.42048	0.76172	0.07759
M	A75HVL5	0.16270	0.25309	0.22954	0.88163
N	A75HVL10	0.41361	0.21148	0.75117	0.18001
O	A75HVL15	0.37416	0.49554	0.44153	0.62376
P	A75HVL20	0.44363	0.3[illegible]29	0.67925	0.43843
Q	A75HVL25	0.28160	0.46723	0.61673	0.52079
R	A75HVL35	0.19303	0.34375	0.85472	0.31133
S	A75HVL40	0.25267	0.15436	0.88852	0.30563
T	A75HVL45	0.16275	0.22716	0.92066	0.18615
U	AHC	-0.25167	-0.17664	-0.92998	0.05343
V	AVC	-0.23532	-0.20683	-0.94205	0.04122
W	APRT5	-0.05196	0.19243	-0.89667	-0.08969

ORTHOGONAL TRANSFORMATION MATRIX

	1	2	3	4
1	0.57741	0.46945	0.61241	0.26678
2	-0.50909	0.83091	-0.20076	0.10059
3	0.63600	0.22188	-0.73472	-0.08038
4	-0.05414	-0.19996	-0.21174	0.95512

TABLE 38 GUYMON.ALF (FACTORAX)

F. FACTOR PATTERN

	FACTOR1	FACTOR2	FACTOR3	FACTOR4
ASM02	0.97580	-0.17581	0.08330	-0.03857
ASM25	0.99151	-0.07667	0.10048	0.01995
ASM59	0.98141	-0.16808	-0.03788	0.04775
ASM915	0.97966	-0.10938	-0.10634	0.11374
ASM1530	0.77130	0.22131	-0.54031	0.06759
ASM3045	0.64625	0.60485	-0.38589	-0.16195
A13L5	0.72602	0.65218	0.03043	-0.19316
A13L10	0.67121	0.49444	0.27401	-0.08477
A13L15	0.87375	0.29604	0.30853	-0.02871
A13L20	0.88443	0.19301	0.26855	0.03181
A13L25	0.96004	-0.08753	-0.03498	0.17372
A13L35	0.70951	0.49256	0.03493	-0.10023
A13L40	0.72800	0.47399	-0.05176	0.09398
A13L45	0.38499	0.70736	-0.33936	-0.44170
A16HHL5	0.68361	0.64613	0.18191	-0.23878
A16HHL10	0.75810	0.38857	0.48009	-0.19274
A16HHL15	0.88717	-0.09274	0.44378	0.04319
A16HHL20	0.78494	-0.29978	0.51300	0.09501
A16HHL25	0.87179	-0.21332	0.42784	0.07661
A16HHL35	0.83369	-0.41227	0.35588	-0.05426
A16HHL40	0.72530	-0.45430	0.49939	0.13467
A16HHL45	0.72035	-0.44394	0.47949	0.04152
A16HVL5	0.27004	-0.25418	0.75382	-0.48552
A16HVL10	0.75001	-0.59061	0.17325	-0.22876
A16HVL15	0.84028	-0.49119	0.03342	-0.04869
A16HVL20	0.88711	-0.37950	0.16663	-0.12148
A16HVL25	0.96049	-0.27199	-0.04122	-0.04173
A16HVL35	0.89848	-0.42297	-0.00368	-0.10302
A16HVL40	0.88845	-0.41807	-0.11553	-0.14398
A16HVL45	0.86682	-0.24900	-0.11046	-0.31642
A75HHL5	0.30244	0.92802	0.10765	0.02091
A75HHL10	0.55960	0.71997	0.33382	-0.12537
A75HHL15	0.76350	0.51058	0.32507	0.19617
A75HHL20	0.79221	0.48104	0.29851	-0.02830
A75HHL25	0.85353	0.06595	0.05446	0.44459
A75HHL35	0.94994	0.00137	-0.15604	0.23465
A75HHL40	0.94379	-0.12721	-0.27251	0.01087
A75HHL45	0.93646	-0.01781	-0.19516	-0.19487
A75HVL5	0.58853	0.17006	-0.07988	0.73404
A75HVL10	0.84615	-0.16754	-0.25639	-0.05181
A75HVL15	0.88548	0.19537	-0.02663	0.38293
A75HVL20	0.96434	-0.00794	-0.16933	0.17626
A75HVL25	0.89856	0.17344	-0.21222	0.25816
A75HVL35	0.87933	0.04708	-0.45397	0.03719
A75HVL40	0.84403	-0.14801	-0.48243	0.05923
A75HVL45	0.81410	-0.06021	-0.53748	-0.07138
AHC	-0.78352	0.17343	0.47973	0.29690
AVC	-0.79889	0.14122	0.49328	0.29294
APRT5	-0.51272	0.35734	0.67565	0.06853

TABLE 38 GUTMON. ALF (FACTOR AX)

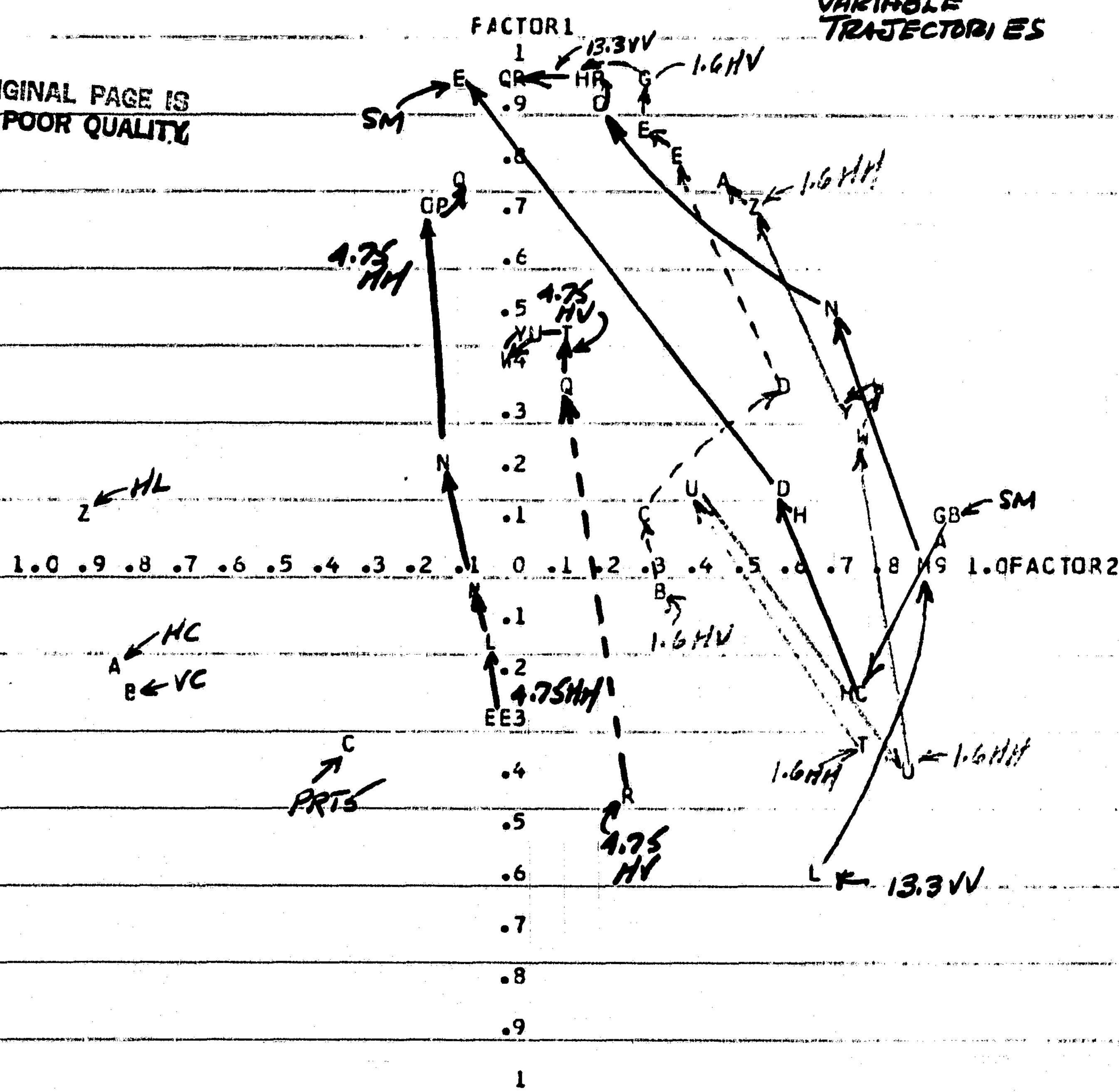
ORIGINAL PAGE IS OF POOR QUALITY

C. EIGENVECTORS

	1	2	3	4
ASM02	0.17222	-0.06617	0.03631	-0.02582
ASM25	0.17500	-0.02886	0.04380	0.01336
ASM59	0.17321	-0.06326	-0.01651	0.03197
ASM915	0.17291	-0.04117	-0.04635	0.07614
ASM1530	0.13613	0.08329	-0.23552	0.04525
ASM3045	0.11406	0.22765	-0.16821	-0.10842
A13L5	0.12814	0.24546	0.01326	-0.12932
A13L10	0.11846	0.18609	0.11944	-0.05675
A13L15	0.15421	0.11142	0.13449	-0.01922
A13L20	0.15610	0.07265	0.11706	0.02130
A13L25	0.16944	-0.03294	-0.01525	0.11630
A13L35	0.12522	0.18538	0.01523	-0.06710
A13L40	0.12849	0.17840	-0.02256	0.06292
A13L45	0.06795	0.26623	-0.14793	-0.29570
A16HHL5	0.12065	0.24318	0.07929	-0.15985
A16HHL10	0.13380	0.14625	0.20927	-0.12903
A16HHL15	0.15658	-0.03491	0.19344	0.02891
A16HHL20	0.13854	-0.11283	0.22362	0.06360
A16HHL25	0.15387	-0.08029	0.18649	0.05129
A16HHL35	0.14714	-0.15517	0.15513	-0.03632
A16HHL40	0.12801	-0.17099	0.21768	0.09016
A16HHL45	0.12714	-0.16708	0.20901	0.02780
A16HVL5	0.04766	-0.09566	0.32859	-0.32504
A16HVL10	0.13237	-0.22229	0.07552	-0.15315
A16HVL15	0.14830	-0.18487	0.01457	-0.03259
A16HVL20	0.15657	-0.14283	0.07263	-0.08132
A16HVL25	0.16952	-0.10237	-0.01797	-0.02794
A16HVL35	0.15858	-0.15919	-0.00160	-0.06897
A16HVL40	0.15681	-0.15735	-0.05036	-0.09639
A16HVL45	0.15299	-0.09372	-0.04815	-0.21183
A75HHL5	0.05338	0.34928	0.04692	0.01400
A75HHL10	0.09877	0.27098	0.14551	-0.08393
A75HHL15	0.13475	0.19217	0.14170	0.13133
A75HHL20	0.13982	0.18105	0.13012	-0.01894
A75HHL25	0.15064	0.02482	0.02374	0.29763
A75HHL35	0.16766	0.00051	-0.06802	0.15709
A75HHL40	0.16657	-0.04788	-0.11878	0.00728
A75HHL45	0.16528	-0.00670	-0.08507	-0.13046
A75HVL5	0.10387	0.06401	-0.03482	0.49141
A75HVL10	0.14934	-0.06306	-0.11176	-0.03468
A75HVL15	0.15628	0.07353	-0.01161	0.25636
A75HVL20	0.17020	-0.00299	-0.07381	0.11800
A75HVL25	0.15859	0.06528	-0.09251	0.17283
A75HVL35	0.15520	0.01772	-0.19788	0.02490
A75HVL40	0.14897	-0.05571	-0.21029	0.03965
A75HVL45	0.14368	-0.02266	-0.23429	-0.04779
AHC	-0.13829	0.06527	0.20911	0.19876
AVC	-0.14100	0.05315	0.21502	0.19611
APRT5	-0.09049	0.13449	0.29451	0.04588

Fig 36 Palihart: Bare Combo Factor ZX

a. PLOT OF FACTOR1 WITH FACTOR2

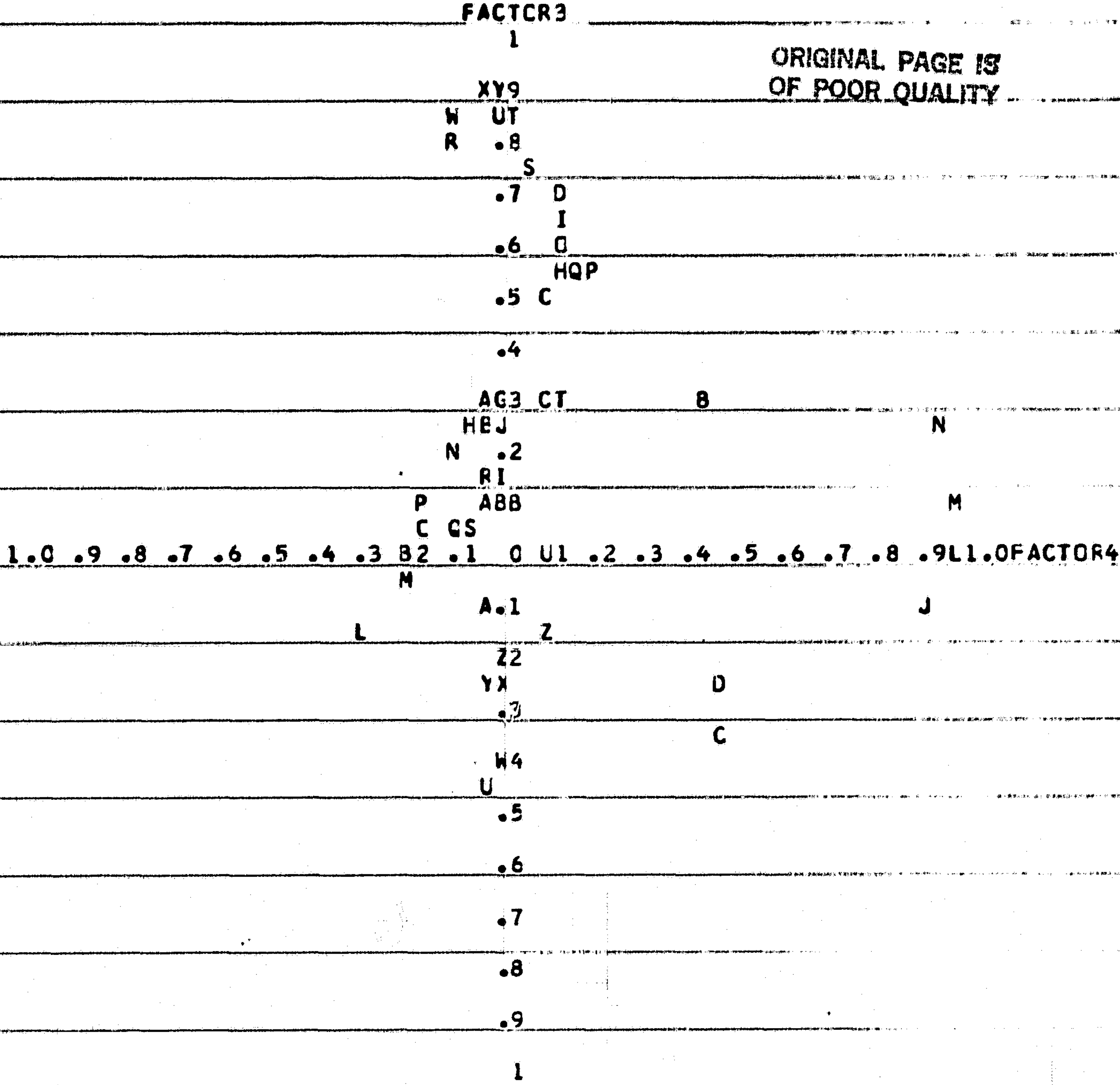


ZFLD02 =A	Z1SM02 =B	Z1SM25 =C	Z1SM515 =D	Z1SM1530=E
Z1SM3045=E	Z2SM02 =G	Z2SM25 =H	Z2SM515 =H	Z2SM1530=E
Z2SM3045=E	Z13VVL5 =L	Z13VVL10=M	Z13VVL15=N	Z13VVL20=O
Z13VVL25=P	Z13VVL35=Q	Z13VVL40=R	Z13VVL45=C	Z16HHL5 =T
Z16HHL10=U	Z16HHL15=U	Z16HHL20=W	Z16HHL25=W	Z16HHL35=Y
Z16HHL40=Z	Z16HHL45=A	Z16HVL5 =B	Z16HVL10=C	Z16HVL15=D
Z16HVL20=E	Z16HVL25=E	Z16HVL35=G	Z16HVL40=H	Z16HVL45=H
Z475HL5 =E	Z475HL10=E	Z475HL15=L	Z475HL20=M	Z475HL25=N
Z475HL35=O	Z475HL40=P	Z475HL45=Q	Z475VL5 =R	Z475VL10=C
Z475VL15=T	Z475VL20=U	Z475VL25=U	Z475VL35=W	Z475VL40=W
Z475VL45=Y	ZMFMRHL =Z	ZMFMRHC =A	ZMFMRVC =B	ZPRT5 =C

Fig 35 Dalhart · Bare Combo

6 PLOT OF FACTOR3 WITH FACTOR4

ORIGINAL PAGE IS
OF POOR QUALITY



ZFLD02 =A	Z1SM02 =B	Z1SM25 =C	Z1SM515 =D	Z1SM1530=E
Z1SM3045=B	Z2SM02 =J	Z2SM25 =H	Z2SM515 =I	Z2SM1530=J
Z2SM3045=J	Z13VVL5 =L	Z13VVL10=M	Z13VVL15=N	Z13VVL20=C
Z13VVL25=P	Z13VVL35=Q	Z13VVL40=R	Z13VVL45=S	Z16HHL5 =T
Z16HHL10=U	Z16HHL15=U	Z16HHL20=W	Z16HHL25=X	Z16HHL35=Y
Z16HHL40=Z	Z16HHL45=A	Z16HVL5 =B	Z16HVL10=C	Z16HVL15=D
Z16HVL20=B	Z16HVL25=B	Z16HVL35=J	Z16HVL40=H	Z16HVL45=I
Z475HL5 =J	Z475HL10=J	Z475HL15=L	Z475HL20=M	Z475HL25=N
Z475HL35=C	Z475HL40=P	Z475HL45=Q	Z475VL5 =R	Z475VL10=S
Z475VL15=T	Z475VL20=U	Z475VL25=U	Z475VL35=W	Z475VL40=X
Z475VL45=Y	ZMFMRHL =Z	ZMFMRHC =A	ZMFMRVC =B	ZPRT5 =C

TABLE 39 DALHART BARE COMBO (FACTORZX)

ORIGINAL PAGE IS
OF POOR QUALITY

a. ROTATED FACTOR PATTERN

		FACTOR1	FACTOR2	FACTOR3	FACTOR4
	ZFLD02	0.07031	0.93329	0.29457	-0.05513
B	Z1SM02	0.11259	0.93907	0.26163	-0.05253
C	Z1SM25	-0.24319	0.76300	0.52202	0.09331
D	Z1SM515	0.15183	0.59349	0.68700	0.10366
E	Z1SM1530	0.93851	-0.10523	0.26677	-0.03731
E	Z1SM3045	0.94869	-0.11254	0.25662	-0.03910
	Z2SM02	0.08528	0.91963	0.29245	-0.01866
	Z2SM25	-0.24376	0.71560	0.54784	0.11890
	Z2SM515	0.12103	0.61051	0.66486	0.12173
	Z2SM1530	0.93882	-0.11076	0.25885	-0.01771
	Z2SM3045	0.94273	-0.11888	0.27082	-0.04684
L	Z13VVL5	-0.61072	0.66657	-0.17141	-0.31467
M	Z13VVL10	-0.00853	0.87113	-0.03617	-0.22652
N	Z13VVL15	0.48717	0.66863	0.22134	-0.13091
O	Z13VVL20	0.90639	0.17344	0.07060	-0.17002
P	Z13VVL25	0.94009	0.16838	0.09636	-0.18087
Q	Z13VVL35	0.96767	-0.02035	0.05100	-0.11796
R	Z13VVL40	0.96126	0.02055	0.15595	-0.04363
Q	Z13VVL45	0.96427	-0.01454	0.07023	-0.09975
T	Z16HHL5	-0.32939	0.76536	0.28872	0.13144
U	Z16HHL10	0.15639	0.39982	-0.44257	-0.04595
U	Z16HHL15	-0.39485	0.86053	0.02460	0.07988
W	Z16HHL20	0.25632	0.75692	-0.42484	-0.01694
W	Z16HHL25	0.34710	0.76824	-0.25343	-0.01574
Y	Z16HHL35	0.29094	0.71073	-0.25296	-0.06645
Z	Z16HHL40	0.72027	0.53328	-0.16450	0.07779
A	Z16HHL45	0.72610	0.44460	-0.08582	-0.05753
B	Z16HVL5	-0.02915	0.31996	0.29384	0.42250
C	Z16HVL10	0.11167	0.27526	-0.35414	0.46536
D	Z16HVL15	0.35481	0.58467	-0.24669	0.46113
E	Z16HVL20	0.80299	0.35842	0.10476	0.02477
E	Z16HVL25	0.87488	0.27212	-0.01463	-0.21204
G	Z16HVL35	0.93274	0.26794	0.22664	-0.00810
H	Z16HVL40	0.93729	0.14458	0.23112	-0.09033
H	Z16HVL45	0.94959	0.16158	0.17037	-0.02312
E	Z475HL5	-0.31251	-0.04886	-0.12106	0.87068
E	Z475HL10	-0.31418	-0.02617	-0.12121	0.88764
L	Z475HL15	-0.16450	-0.05235	-0.01453	0.94479
M	Z475HL20	-0.06318	-0.08213	0.09873	0.96453
N	Z475HL25	0.20566	-0.14416	0.26523	0.91412
O	Z475HL35	0.69904	-0.17759	0.58127	0.12035
P	Z475HL40	0.71775	-0.14281	0.55991	0.18437
Q	Z475HL45	0.73022	-0.13194	0.55348	0.16315
R	Z475VL5	-0.43215	0.26019	0.79248	-0.11368
Q	Z475VL10	0.34670	0.13142	0.73352	0.04028
T	Z475VL15	0.43479	0.10766	0.84655	0.00395
U	Z475VL20	0.45743	0.04379	0.85704	-0.02480
U	Z475VL25	0.43511	0.05292	0.86667	-0.00368
W	Z475VL35	0.40781	-0.01522	0.87423	-0.10975
W	Z475VL40	0.41445	-0.00142	0.88583	-0.05179

TABLE 39 DALHART. BARE COMBO (FACTOR ZX)-CONT.-

a. RCTATED FACTCR PATTERN

		FACTOR1	FACTOR2	FACTOR3	FACTOR4
Y	Z475VL45	0.43820	0.00767	0.88267	-0.03022
Z	ZMFMRHL	0.09767	-0.92831	-0.17966	-0.02057
A	ZMFMRPC	-0.17958	-0.83804	0.12351	-0.06193
B	ZMFMRVC	-0.25249	-0.83103	0.10429	-0.01936
C	ZPRT5	-0.32731	-0.35383	0.31596	0.07935

ORTHOGCNAL TRANSFORMATICN MATRIX

	1	2	3	4
1	0.85537	0.30532	0.41488	-0.05465
2	-0.32431	0.94529	-0.02357	0.02633
3	-0.37482	-0.11318	0.88789	0.24157
4	0.15058	0.01976	-0.19741	0.96849

VARIANCE EXPLAINEC BY EACH FACTCR

FACTCR1	FACTOR2	FACTCR3	FACTOR4
18.087463	13.239534	10.093186	5.338351

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Table 39 Dalhart. Bare Combo (Factor ZX)

FACTOR PATTERN

	FACTOR1	FACTOR2	FACTOR3	FACTOR4
ZFLD02	0.47032	0.85104	0.11624	-0.08251
Z1SM02	0.49445	0.84363	0.07112	-0.06701
Z1SM25	0.23642	0.79028	0.49083	-0.03422
Z1SM515	0.59043	0.49832	0.51094	-0.00065
Z1SM1530	0.88337	-0.41110	-0.11201	0.05044
Z1SM3045	0.88573	-0.42113	-0.12444	0.05210
Z2SM02	0.47609	0.83428	0.11911	-0.04479
Z2SM25	0.23077	0.74572	0.52552	-0.01557
Z2SM515	0.55912	0.52540	0.50526	0.01693
Z2SM1530	0.87758	-0.41573	-0.11380	0.07092
Z2SM3045	0.88501	-0.42573	-0.11075	0.04078
Z13VVL5	-0.37280	0.82392	-0.07474	-0.34971
Z13VVL10	0.25605	0.82112	-0.18224	-0.19632
Z13VVL15	0.71984	0.46539	-0.09338	-0.08391
Z13VVL20	0.86684	-0.13614	-0.33775	-0.03869
Z13VVL25	0.90541	-0.15274	-0.32956	-0.04931
Z13VVL35	0.84911	-0.33736	-0.34361	0.02100
Z13VVL40	0.89560	-0.29714	-0.23470	0.07211
Z13VVL45	0.85496	-0.23075	-0.32153	0.03444
Z16HHL5	0.06453	0.82697	0.32494	0.03583
Z16HHL10	0.07474	0.33645	-0.50792	0.07431
Z16HHL15	-0.06916	0.94302	0.09174	0.03005
Z16HHL20	0.27502	0.64195	-0.56305	0.12101
Z16HHL25	0.42717	0.61920	-0.44587	0.10223
Z16HHL35	0.36455	0.58171	-0.43015	0.04343
Z16HHL40	0.70642	0.27644	-0.45760	0.22680
Z16HHL45	0.72437	0.18531	-0.41257	0.07934
Z16HVL5	0.17157	0.21611	0.33707	0.35311
Z16HVL10	0.00720	0.24458	-0.27504	0.54286
Z16HVL15	0.35446	0.45557	-0.30681	0.56027
Z16HVL20	0.83840	0.07658	-0.24254	0.13130
Z16HVL25	0.83695	-0.03174	-0.42293	-0.06536
Z16HVL35	0.97412	-0.05477	-0.18066	0.09315
Z16HVL40	0.94670	-0.17513	-0.18429	0.01088
Z16HVL45	0.93353	-0.15984	-0.22653	0.09015
Z475HL5	-0.38004	0.08094	0.22550	0.81912
Z475HL10	-0.37553	0.10338	0.22753	0.83577
Z475HL15	-0.21435	0.02908	0.28291	0.89208
Z475HL20	-0.09087	-0.03408	0.35364	0.90350
Z475HL25	0.19198	-0.18515	0.39555	0.86107
Z475HL35	0.77830	-0.40510	0.30326	0.10355
Z475HL40	0.79256	-0.37611	0.28882	0.17328
Z475HL45	0.80504	-0.37028	0.27207	0.15610
Z475VL5	0.04480	0.36443	0.80870	-0.32648
Z475VL10	0.63881	-0.00443	0.51619	-0.05100
Z475VL15	0.75578	-0.05908	0.57745	-0.09570
Z475VL20	0.76157	-0.12780	0.57855	-0.12346
Z475VL25	0.74811	-0.11160	0.59954	-0.10809
Z475VL35	0.71288	-0.17014	0.59857	-0.21777
Z475VL40	0.72442	-0.15799	0.61883	-0.16265
Z475VL45	0.74502	-0.15646	0.61129	-0.13738
ZMFMRHL	-0.27331	-0.90551	-0.09602	0.01191
ZMFMRHC	-0.35485	-0.73850	0.25687	-0.12796
ZMFMRVC	-0.42537	-0.70665	0.27662	-0.09377
ZPRT5	-0.26125	-0.23368	0.46244	-0.04180

TABLE 39 DALHART. BARE COMBO FACTOR 2X

C. EIGENVECTORS

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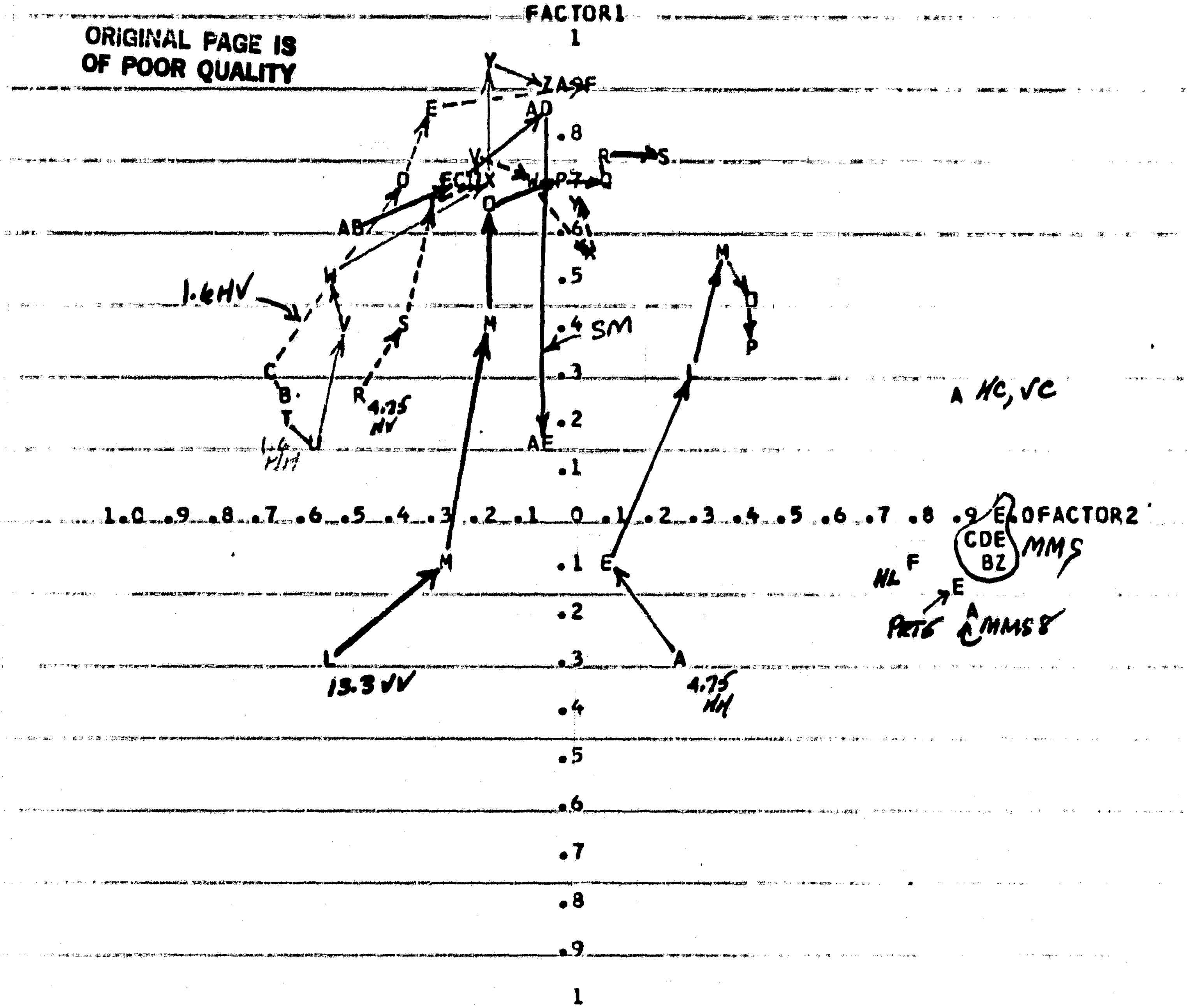
	1	2	3	4
ZFLD02	0.10202	0.24087	0.04135	-0.03646
Z1SM02	0.10726	0.23877	0.02530	-0.02961
Z1SM25	0.05129	0.22367	0.17462	-0.01512
Z1SM515	0.12808	0.14104	0.18177	-0.00029
Z1SM1530	0.19163	-0.11635	-0.03985	0.02228
Z1SM3045	0.19214	-0.11919	-0.04427	0.02302
Z2SM02	0.10328	0.23612	0.04237	-0.01979
Z2SM25	0.05006	0.21106	0.18696	-0.00688
Z2SM515	0.12129	0.14870	0.17975	0.00748
Z2SM1530	0.19037	-0.11766	-0.04049	0.03134
Z2SM3045	0.19198	-0.12049	-0.03940	0.01802
Z13VVL5	-0.08087	0.23319	-0.02659	-0.15450
Z13VVL10	0.05554	0.23240	-0.06483	-0.08674
Z13VVL15	0.15615	0.13172	-0.03322	-0.03707
Z13VVL20	0.18804	-0.03853	-0.12016	-0.01709
Z13VVL25	0.19641	-0.04323	-0.11724	-0.02178
Z13VVL35	0.18420	-0.09548	-0.12224	0.00928
Z13VVL40	0.19428	-0.08410	-0.08350	0.03186
Z13VVL45	0.18546	-0.09361	-0.11439	0.01522
Z16HHL5	0.01400	0.23405	0.11560	0.01583
Z16HHL10	0.01621	0.09522	-0.18070	0.03283
Z16HHL15	-0.01500	0.26690	0.03264	0.01328
Z16HHL20	0.05966	0.18169	-0.20031	0.05347
Z16HHL25	0.09267	0.17525	-0.15862	0.04517
Z16HHL35	0.07908	0.16464	-0.15303	0.01919
Z16HHL40	0.15324	0.07824	-0.16280	0.10020
Z16HHL45	0.15714	0.05245	-0.14678	0.03505
Z16HVL5	0.03722	0.08947	0.12013	0.15601
Z16HVL10	0.00156	0.06922	-0.09785	0.23984
Z16HVL15	0.07689	0.12894	-0.10915	0.24754
Z16HVL20	0.18187	0.02167	-0.08629	0.05801
Z16HVL25	0.18156	-0.00898	-0.15046	-0.02888
Z16HVL35	0.21131	-0.01550	-0.06427	0.04116
Z16HVL40	0.20537	-0.04956	-0.06556	0.00481
Z16HVL45	0.20251	-0.04524	-0.08130	0.03983
Z475HL5	-0.08244	0.02291	0.08023	0.36190
Z475HL10	-0.08146	0.02926	0.08095	0.36925
Z475HL15	-0.04650	0.00823	0.10065	0.39413
Z475HL20	-0.01971	-0.00964	0.12581	0.39918
Z475HL25	0.04165	-0.05240	0.14072	0.38043
Z475HL35	0.16883	-0.11465	0.10789	0.04575
Z475HL40	0.17193	-0.10645	0.10275	0.07656
Z475HL45	0.17464	-0.10480	0.09679	0.06896
Z475VL5	0.00972	0.10314	0.28770	-0.14424
Z475VL10	0.13858	-0.00125	0.18364	-0.02253
Z475VL15	0.16395	-0.01672	0.20543	-0.04228
Z475VL20	0.16520	-0.03617	0.20583	-0.05455
Z475VL25	0.16229	-0.03159	0.21329	-0.04776
Z475VL35	0.15464	-0.04815	0.21295	-0.09621
Z475VL40	0.15715	-0.04472	0.22015	-0.07186
Z475VL45	0.16162	-0.04428	0.21747	-0.06070
ZMFMRHL	-0.05929	-0.25628	-0.03416	0.00526
ZMFMRHC	-0.07698	-0.20901	0.09138	-0.05653
ZMFMRVC	-0.09227	-0.20000	0.09841	-0.04143
ZPRT5	-0.05667	-0.06614	0.16452	-0.01847

Fig 36 DALHART: STUB-(FACTORSX)- VARIABLE TRAJECTORIES

a. PLOT OF FACTOR1 WITH FACTOR2



SFLD02 =Z	S1SM02 =B	S1SM25 =C	S1SM515 =D	S1SM1530=E
S1SM3045=E	S2SM02 =A	S2SM25 =F	S2SM515 =A	S2SM1530=A
S2SM3045=E	S13VVL5 =L	S13VVL10=M	S13VVL15=M	S13VVL20=O
S13VVL25=P	S13VVL35=P	S13VVL40=R	S13VVL45=S	S16HHL5 =T
S16HHL10=U	S16HHL15=V	S16HHL20=W	S16HHL25=X	S16HHL35=Y
S16HHL40=Z	S16HHL45=Z	S16HVL5 =B	S16HVL10=C	S16HVL15=D
S16HVL20=E	S16HVL25=E	S16HVL35=A	S16HVL40=F	S16HVL45=A
S475HL5 =A	S475HL10=E	S475HL15=L	S475HL20=M	S475HL25=N
S475HL35=O	S475HL40=P	S475HL45=P	S475VL5 =R	S475VL10=S
S475VL15=T	S475VL20=U	S475VL25=V	S475VL35=W	S475VL40=X
S475VL45=Y	SNS1 =Z	SNS2 =Z	SNS3 =B	SNS4 =C
SNS5 =D	SNS6 =E	SNS7 =E	SNS8 =A	SMFMRHL =F
SMFMRHC =A	SMFMRVC =A	SPRT5 =E		

FIG 36a' EIGEN VECTORS FOR FACTOR SX

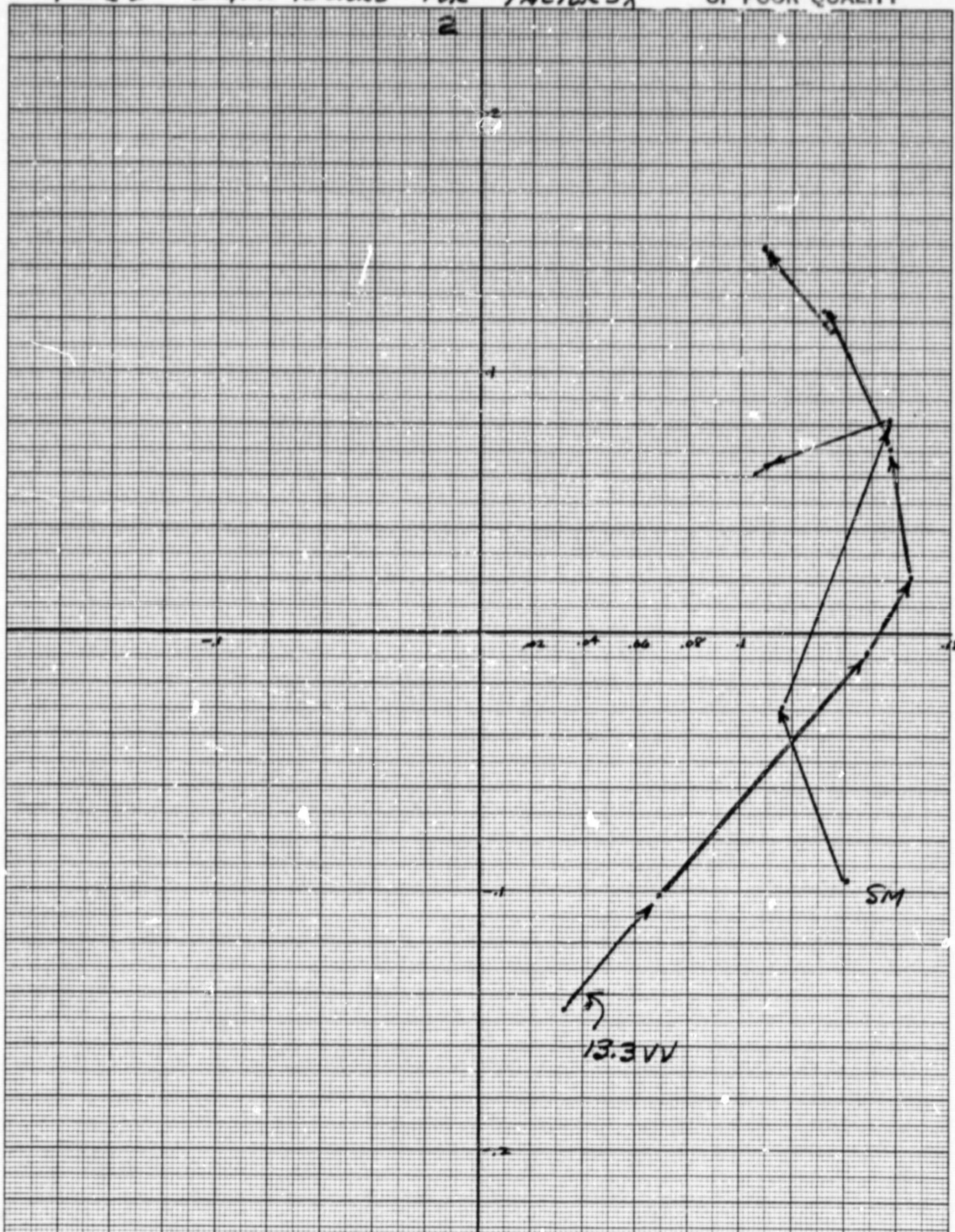
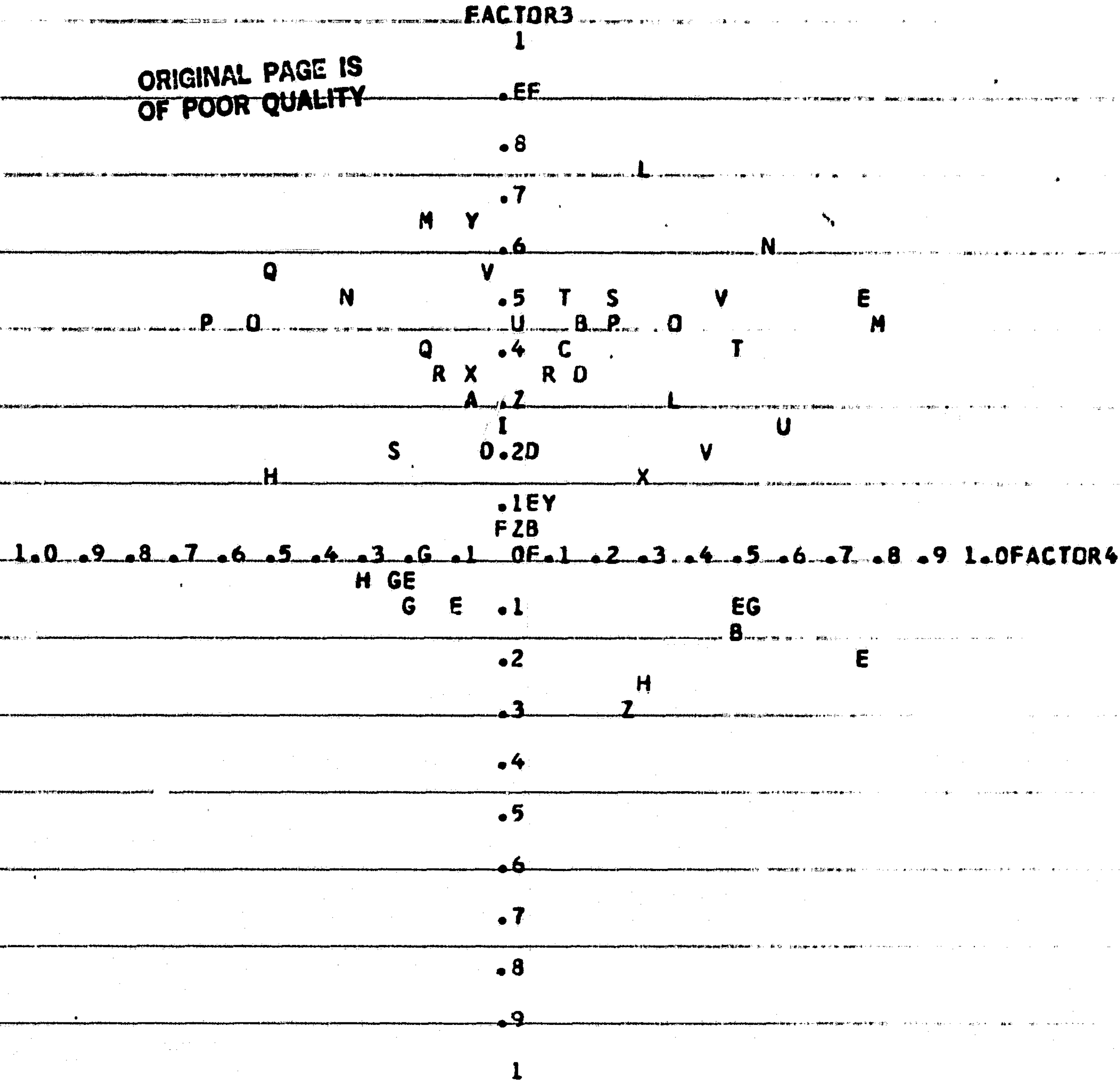


Fig 36 Dalhart, Stub (Factor Sx)

b. PLOT OF FACTOR3 WITH FACTOR4



SFLD02 =E	S1SM02 =B	S1SM25 =Z	S1SM515 =D	S1SM1530=B
S1SM3045=F	S2SM02 =G	S2SM25 =H	S2SM515 =G	S2SM1530=E
S2SM3045=E	S13VVL5 =L	S13VVL10=M	S13VVL15=N	S13VVL20=O
S13VVL25=P	S13VVL35=Q	S13VVL40=R	S13VVL45=S	S16HHL5 =T
S16HHL10=U	S16HHL15=V	S16HHL20=V	S16HHL25=X	S16HHL35=Y
S16HHL40=Z	S16HHL45=E	S16HVL5 =B	S16HVL10=Z	S16HVL15=D
S16HVL20=B	S16HVL25=F	S16HVL35=G	S16HVL40=H	S16HVL45=G
S475HL5 =E	S475HL10=E	S475HL15=L	S475HL20=M	S475HL25=N
S475HL35=O	S475HL40=P	S475HL45=Q	S475VL5 =R	S475VL10=S
S475VL15=T	S475VL20=U	S475VL25=V	S475VL35=V	S475VL40=X
S475VL45=Y	SNS1 =Z	SNS2 =E	SNS3 =B	SNS4 =Z
SNS5 =D	SNS6 =B	SNS7 =F	SNS8 =G	SMFMRHL =H
SMFMRHC =G	SMFMRVC =E	SPRT5 =E		

TABLE 40 DALHART. STUB (FACTOR SX)

ORIGINAL PAGE IS OF POOR QUALITY

a. ROTATED FACTOR PATTERN

		FACTOR1	FACTOR2	FACTOR3	FACTOR4
Z	SFLD02	0.61948	-0.50402	-0.07763	0.48923
B	S1SM02	0.61508	-0.48123	-0.12792	0.47983
C	S1SM25	0.71223	-0.24549	-0.28660	0.25405
D	S1SM515	0.86060	-0.05994	0.19853	-0.04911
E	S1SM1530	0.13601	-0.04282	0.90634	0.03017
E	S1SM3045	0.13722	-0.05258	0.90399	0.03518
A	S2SM02	0.59139	-0.50160	-0.11354	0.50812
F	S2SM25	0.71489	-0.28508	-0.24898	0.29630
A	S2SM515	0.84430	-0.08699	0.23740	-0.01161
A	S2SM1530	0.13075	-0.07017	0.91752	0.01934
E	S2SM3045	0.13308	-0.06323	0.91181	0.02455
L	S13VVL5	-0.31194	-0.53431	0.30943	0.34038
M	S13VVL10	-0.11719	-0.27762	0.46742	0.76947
N	S13VVL15	0.41345	-0.18180	0.58556	0.54899
O	S13VVL20	0.63949	-0.17524	0.44234	0.34676
P	S13VVL25	0.70743	-0.02032	0.43704	0.20206
Q T	S13VVL35	0.69255	0.09941	0.39955	-0.17517
R	S13VVL40	0.73627	0.07936	0.33911	-0.13954
S	S13VVL45	0.73614	0.22771	0.22466	-0.23912
T	S16HHL5	0.20606	-0.63585	0.39143	0.49364
U	S16HHL10	0.16186	-0.59375	0.26251	0.59359
V	S16HHL15	0.40969	-0.53004	0.51657	0.45267
W	S16HHL20	0.52474	-0.55385	0.20058	0.40900
X	S16HHL25	0.68245	-0.19927	0.15413	0.29050
Y	S16HHL35	0.92634	-0.18413	0.12076	0.08592
Z	S16HHL40	0.91331	-0.05574	0.28906	0.01084
Z	S16HHL45	0.88377	-0.00185	0.28883	-0.09465
B	S16HVL5	0.25246	-0.64219	0.42993	0.16055
C	S16HVL10	0.31584	-0.69558	0.39907	0.11120
D	S16HVL15	0.69372	-0.39092	0.35374	0.15610
E	S16HVL20	0.85483	-0.31668	0.11764	0.05988
F E	S16HVL25	0.91099	0.06400	0.05477	-0.02385
A	S16HVL35	0.91648	0.04972	0.00090	-0.17320
F	S16HVL40	0.89416	0.04689	-0.05277	-0.31457
A	S16HVL45	0.88251	-0.02013	-0.00180	-0.18516
A	S475HL5	-0.32352	0.24354	-0.17779	0.75762
E	S475HL10	-0.08242	0.09367	0.49658	0.74417
L	S475HL15	0.27967	0.26906	0.75180	0.28603
M	S475HL20	0.52558	0.34719	0.65708	-0.16889
N	S475HL25	0.54887	0.33915	0.52128	-0.35000
O	S475HL35	0.42508	0.42709	0.44970	-0.53486
P	S475HL40	0.34352	0.40262	0.43884	-0.64850
P	S475HL45	0.34336	0.40735	0.56761	-0.51990
R	S475VL5	0.23253	-0.48085	0.32533	0.06902
S	S475VL10	0.38963	-0.38787	0.47508	0.22498
T	S475VL15	0.65056	-0.30023	0.52123	0.12370
U	S475VL20	0.71188	-0.21162	0.45527	0.00574
V	S475VL25	0.72666	-0.20160	0.54729	-0.05554
W	S475VL35	0.70083	-0.06822	0.56556	-0.06175
X	S475VL40	0.54724	0.03685	0.35359	-0.07679

TABLE 40 DALHART: STUB (FACTOR SX) - CONT. -

a. ROTATED FACTOR PATTERN

		FACTOR1	FACTOR2	FACTOR3	FACTOR4
Y	S475VL45	0.63205	0.02476	0.63276	-0.08521
	SNS1	-0.07857	0.98097	0.05049	0.01847
	SNS2	-0.09284	0.97760	0.08885	0.03380
	SNS3	-0.12257	0.95857	0.04324	0.04532
	SNS4	-0.05872	0.92269	0.32019	0.01254
	SNS5	-0.03340	0.95222	0.21636	0.05249
	SNS6	-0.06916	0.97591	0.03926	0.04709
	SNS7	0.01435	0.97365	-0.01046	0.04081
	SNS8	-0.17697	0.90989	-0.08389	-0.20048
F	SMFMRHL	-0.07997	0.78396	0.15127	-0.51740
A	SMFMRHC	0.24498	0.88065	-0.06454	-0.26083
A	SMFMRVC	0.22782	0.89375	-0.05470	-0.22612
E	SPRT5	-0.17373	0.89596	-0.09517	-0.10429

ORTHOGONAL TRANSFORMATION MATRIX

	1	2	3	4
1	0.78402	-0.41933	0.43286	0.14870
2	0.35293	0.82312	0.27758	-0.34766
3	-0.47129	0.07542	0.80806	0.34530
4	0.19658	0.37543	-0.28744	0.85895

VARIANCE EXPLAINED BY EACH FACTOR

FACTOR1	FACTOR2	FACTOR3	FACTOR4
18.742272	15.743236	10.607929	6.339033

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TABLE 40 DALHART. STUB (FACTOR 5X)

b. FACTOR PATTERN

	FACTOR1	FACTOR2	FACTOR3	FACTOR4
SFLD02	0.73618	-0.38787	-0.22377	0.37508
S1SM02	0.70001	-0.38135	-0.26386	0.38916
S1SM25	0.57507	-0.11857	-0.49805	0.34844
S1SM515	0.77850	0.32657	-0.26664	0.04742
S1SM1530	0.52139	0.25384	0.67547	-0.22394
S1SM3045	0.52616	0.24384	0.67399	-0.22239
S2SM02	0.70041	-0.41233	-0.23284	0.39702
S2SM25	0.61632	-0.15447	-0.45730	0.35958
S2SM515	0.79946	0.29631	-0.21665	0.05510
S2SM1530	0.53196	0.23634	0.68118	-0.24776
S2SM3045	0.52919	0.23949	0.67779	-0.23858
S13VVL5	0.16404	-0.58234	0.47429	-0.05849
S13VVL10	0.34129	-0.40764	0.67769	0.39931
S13VVL15	0.73549	-0.03205	0.45417	0.31626
S13VVL20	0.81789	0.08368	0.16257	0.23062
S13VVL25	0.78238	0.28401	0.08799	0.17937
S13VVL35	0.64819	0.49805	-0.05651	-0.09185
S13VVL40	0.67001	0.46782	-0.11517	-0.04280
S13VVL45	0.54335	0.59273	-0.23079	-0.03977
S16HHL5	0.67102	-0.51362	0.34168	0.11329
S16HHL10	0.57777	-0.56510	0.29603	0.24331
S16HHL15	0.83438	-0.30568	0.34068	0.12188
S16HHL20	0.79130	-0.35720	0.01424	0.18887
S16HHL25	0.72853	0.01862	-0.11180	0.26456
S16HHL35	0.86852	0.17903	-0.32321	0.15205
S16HHL40	0.86616	0.35292	-0.19731	0.08483
S16HHL45	0.80461	0.42346	-0.21594	0.00872
S16HVL5	0.67720	-0.37597	0.23544	-0.17715
S16HVL10	0.72858	-0.38896	0.15956	-0.21825
S16HVL15	0.88415	-0.03302	-0.01667	0.02201
S16HVL20	0.86282	0.05286	-0.31102	0.06677
S16HVL25	0.70756	0.39769	-0.38849	0.16688
S16HVL35	0.67232	0.42485	-0.48725	0.04979
S16HVL40	0.61176	0.44889	-0.56913	-0.06166
S16HVL45	0.67203	0.35876	-0.48283	0.00740
S475HL5	-0.32007	-0.22646	0.28878	0.72969
S475HL10	0.22171	-0.07287	0.70414	0.51543
S475HL15	0.47440	0.42941	0.59476	0.18558
S475HL20	0.52579	0.71238	0.25113	-0.10027
S475HL25	0.46170	0.73925	0.06727	-0.21524
S475HL35	0.26930	0.81234	0.01057	-0.34477
S475HL40	0.19401	0.79991	-0.00085	-0.46448
S475HL45	0.26676	0.79478	0.14804	-0.38928
S475VL5	0.53502	-0.24742	0.14087	-0.16904
S475VL10	0.70722	-0.12810	0.24870	-0.01234
S475VL15	0.87996	0.08415	0.13465	-0.02840
S475VL20	0.84478	0.20143	0.01841	-0.06544
S475VL25	0.88289	0.26175	0.06540	-0.13786
S475VL35	0.81370	0.36965	0.10025	-0.10344
S475VL40	0.55522	0.34832	0.00408	-0.04618

TABLE 40 DALHART. STUB (FACTORSX) -CONT.-

b. FACTOR PATTERN

	FACTOR1	FACTOR2	FACTOR3	FACTOR4
S475VL45	0.74638	0.44872	0.18588	-0.12152
SNS1	-0.44835	0.78732	0.15819	0.35419
SNS2	-0.43924	0.78482	0.20095	0.35226
SNS3	-0.47260	0.74201	0.18066	0.36229
SNS4	-0.29248	0.82328	0.36033	0.25360
SNS5	-0.32402	0.81381	0.28051	0.33383
SNS6	-0.43945	0.77341	0.15418	0.38196
SNS7	-0.39549	0.78941	0.07231	0.40642
SNS8	-0.58641	0.73290	0.01501	0.15873
SMFMRHL	-0.40290	0.83893	0.04039	-0.20929
SMFMRHC	-0.24394	0.88411	-0.19125	0.17329
SMFMRVC	-0.25346	0.87950	-0.16225	0.20183
SPRT5	-0.56861	0.68601	0.03654	0.24000

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TABLE 40 DALHART. STUB (FACTOR SX)

C. EIGENVECTORS

	1	2	3	4
SFLD02	0.14860	-0.09713	-0.08583	0.18423
S1SM02	0.14130	-0.09550	-0.10121	0.19114
S1SM25	0.11608	-0.02969	-0.19103	0.17114
S1SM515	0.15714	0.08178	-0.10227	0.02329
S1SM1530	0.10525	0.06356	0.25908	-0.10999
S1SM3045	0.10621	0.06106	0.25852	-0.10923
S2SM02	0.14138	-0.10325	-0.08931	0.19500
S2SM25	0.12441	-0.03868	-0.17540	0.17661
S2SM515	0.16137	0.07420	-0.08310	0.02706
S2SM1530	0.10738	0.05918	0.26128	-0.12169
S2SM3045	0.10682	0.05997	0.25998	-0.11718
S13VVL5	0.03311	-0.14583	0.18192	-0.02873
S13VVL10	0.06889	-0.10208	0.25994	0.19612
S13VVL15	0.14846	-0.00802	0.17420	0.15533
S13VVL20	0.16510	0.02095	0.06236	0.11327
S13VVL25	0.15793	0.07112	0.03375	0.08810
S13VVL35	0.13084	0.12472	-0.02168	-0.04511
S13VVL40	0.13524	0.11715	-0.04417	-0.02102
S13VVL45	0.10968	0.14843	-0.08852	-0.01953
S16HHL5	0.13545	-0.12862	0.13106	0.05564
S16HHL10	0.11663	-0.14151	0.11355	0.11950
S16HHL15	0.16842	-0.07655	0.13067	0.05986
S16HHL20	0.15973	-0.08945	0.00546	0.09277
S16HHL25	0.14706	0.00466	-0.04288	0.12994
S16HHL35	0.17532	0.04483	-0.12397	0.07468
S16HHL40	0.17484	0.08838	-0.07568	0.04167
S16HHL45	0.16242	0.10604	-0.08282	0.00428
S16HVL5	0.13670	-0.09415	0.09030	-0.08701
S16HVL10	0.14707	-0.09740	0.06120	-0.10719
S16HVL15	0.17847	-0.00827	-0.00640	0.01081
S16HVL20	0.17417	0.01324	-0.11929	0.03279
S16HVL25	0.14282	0.09959	-0.14901	0.08196
S16HVL35	0.13571	0.10639	-0.18689	0.02446
S16HVL40	0.12349	0.11241	-0.21830	-0.03028
S16HVL45	0.13565	0.08984	-0.18519	0.00363
S475HL5	-0.06461	-0.05671	0.11077	0.35839
S475HL10	0.04475	-0.01825	0.27008	0.25316
S475HL15	0.09576	0.10753	0.22813	0.09115
S475HL20	0.10613	0.17839	0.09632	-0.04925
S475HL25	0.09320	0.18512	0.02580	-0.10572
S475HL35	0.05436	0.20342	0.00405	-0.16934
S475HL40	0.03916	0.20031	-0.00033	-0.22813
S475HL45	0.05385	0.19902	0.05678	-0.19120
S475VL5	0.10800	-0.06196	0.05403	-0.08303
S475VL10	0.14276	-0.03208	0.09539	-0.00606
S475VL15	0.17762	0.02107	0.05165	-0.01395
S475VL20	0.17052	0.05044	0.00706	-0.03214
S475VL25	0.17822	0.06554	0.02508	-0.06771
S475VL35	0.16425	0.09256	0.03845	-0.05081
S475VL40	0.11207	0.08722	0.00157	-0.02268

TABLE 40 DALHART. STUB (FACTORSX) -CONT.-

c. EIGENVECTORS

	1	2	3	4
S475VL45	0.15066	0.11236	0.07130	-0.05969
SNS1	-0.09050	0.19715	0.06068	0.17396
SNS2	-0.08866	0.19653	0.07708	0.17302
SNS3	-0.09540	0.18581	0.06929	0.17794
SNS4	-0.05904	0.20616	0.13821	0.12456
SNS5	-0.06540	0.20379	0.10759	0.16396
SNS6	-0.08871	0.19367	0.05914	0.18760
SNS7	-0.07983	0.19768	0.02774	0.19962
SNS8	-0.11837	0.18353	0.00576	0.07796
SMFMRHL	-0.08133	0.21008	0.01549	-0.10280
SMFMRHC	-0.04924	0.22139	-0.07336	0.08511
SMFMRVC	-0.05116	0.22024	-0.06223	0.09913
SPRT5	-0.11478	0.17178	0.01402	0.11788

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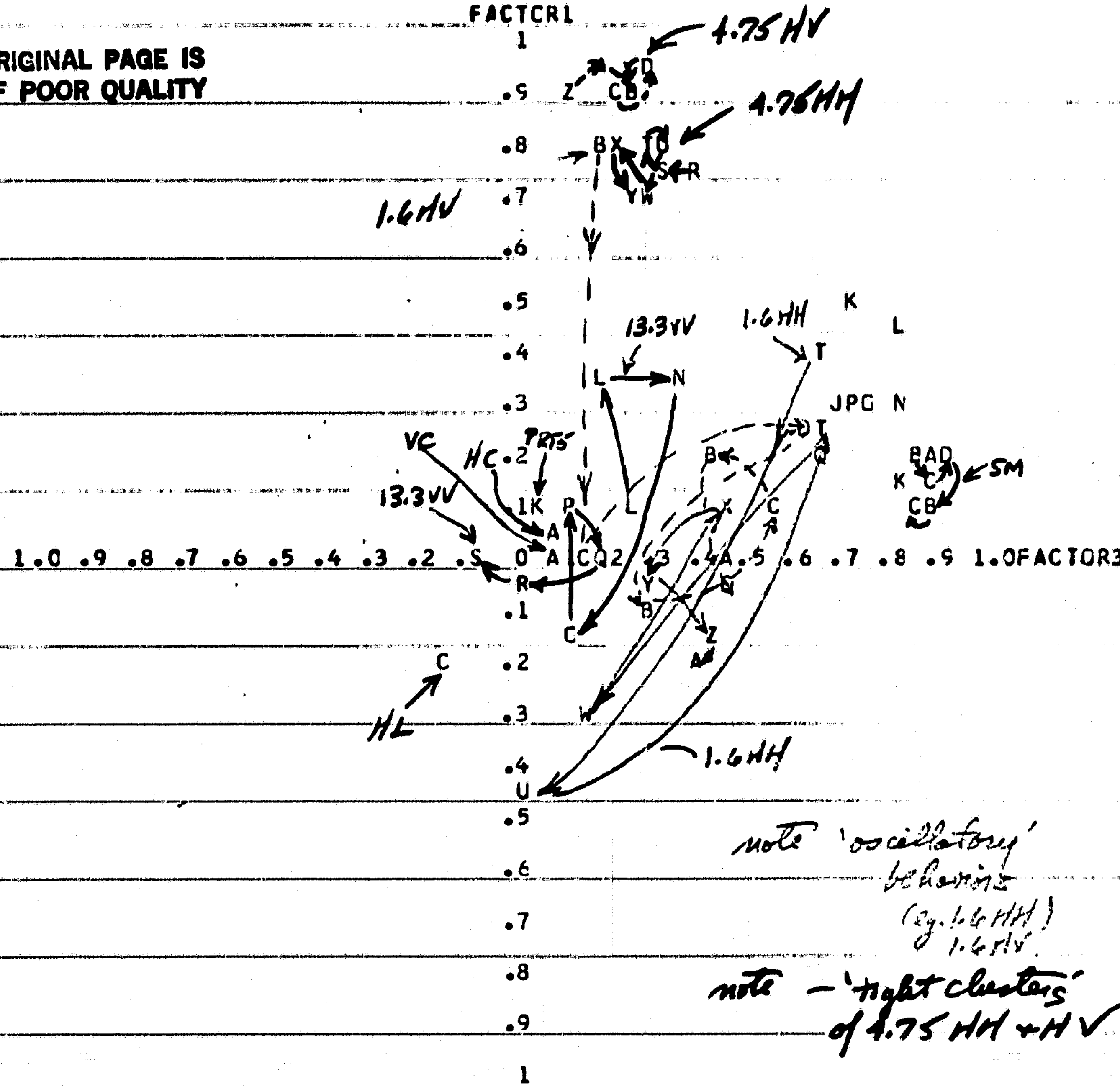
Fig 37 DALHART. CORN (FACTOR CX) - VARIABLE TRAJECTORIES

a. PLOT OF FACTOR1 WITH FACTOR3



CFLD02 =A	C1SM02 =B	C1SM25 =C	C1SM515 =D	C1SM1530=B
C1SM3045=C	C2SM02 =B	C2SM25 =C	C2SM515 =A	C2SM1530=A
C2SM3045=K	C13VVL5 =L	C13VVL10=L	C13VVL15=N	C13VVL20=C
C13VVL25=P	C13VVL35=Q	C13VVL40=R	C13VVL45=S	C16HHL5 =T
C16HHL10=L	C16HHL15=T	C16HHL20=W	C16HHL25=X	C16HHL35=Y
C16HHL40=Z	C16HHL45=A	C16HVL5 =B	C16HVL10=C	C16HVL15=D
C16HVL20=B	C16HVL25=C	C16HVL35=B	C16HVL40=C	C16HVL45=A
C4HVL5 =A	C4HVL10 =K	C4HVL15 =L	C4HVL20 =L	C4HVL25 =N
C4HVL35 =O	C4HVL40 =P	C4HVL45 =Q	C475HL5 =R	C475HL10=S
C475HL15=T	C475HL20=U	C475HL25=T	C475HL35=W	C475HL40=X
C475HL45=Y	C475VL5 =Z	C475VL10=A	C475VL15=B	C475VL20=C
C475VL25=D	C475VL35=B	C475VL40=C	C475VL45=B	CMFMRHL =C
CMFMRHC =A	CMFMRVC =A	CPRTS =K		

FIG 37 DALHART. CORN (FACTOR C X)

b. PLOT OF FACTOR2 WITH FACTOR4

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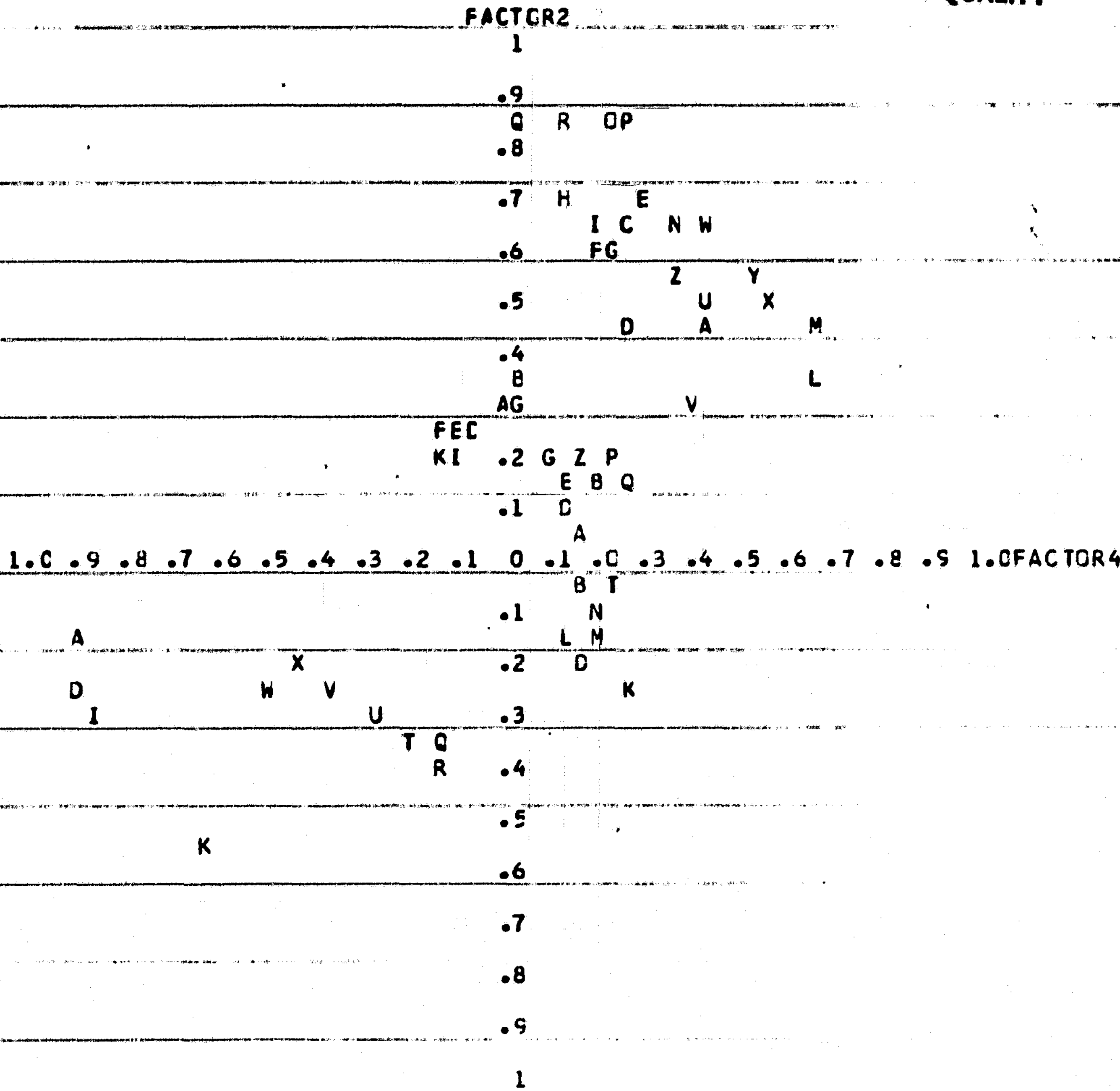

CFLD02 =A	C1SM02 =E	C1SM25 =B	C1SM515 =D	C1SM1530=E
C1SM3045=Z	C2SM02 =G	C2SM25 =A	C2SM515 =I	C2SM1530=D
C2SM3045=K	C13VVL5 =L	C13VVL10=M	C13VVL15=N	C13VVL20=O
C13VVL25=P	C13VVL35=C	C13VVL40=R	C13VVL45=C	C16HHL5 =T
C16HHL10=U	C16HHL15=V	C16HHL20=W	C16HHL25=X	C16HHL35=W
C16HHL40=Z	C16HHL45=A	C16HVL5 =B	C16HVL10=B	C16HVL15=D
C16HVL20=E	C16HVL25=Z	C16HVL35=G	C16HVL40=A	C16HVL45=I
C4HVL5 =D	C4HVL10 =K	C4HVL15 =L	C4HVL20 =M	C4HVL25 =N
C4HVL35 =C	C4HVL40 =P	C4HVL45 =Q	C475HL5 =R	C475HL10=Q
C475HL15=T	C475HL20=U	C475HL25=V	C475HL35=W	C475HL40=X
C475HL45=W	C475VL5 =Z	C475VL10=A	C475VL15=B	C475VL20=B
C475VL25=D	C475VL35=E	C475VL40=Z	C475VL45=G	CMFMRHL =A
CMFMRHC =I	CMFMRVC =D	CPRT5 =K		

TABLE 41 DALHART: CORN (FACTOR CX)

a. RCTATED FACTCR PATTERN

		FACTOR1	FACTCR2	FACTOR3	FACTOR4
	CFLD02	0.19521	0.31049	0.87229	-0.00557
B	C1SM02	0.18272	0.33913	0.85461	0.03011
C	C1SM25	0.14788	0.32159	0.88090	0.01491
D	C1SM515	0.18609	0.25335	0.90282	-0.08899
B	C1SM1530	0.10238	0.24313	0.88340	-0.11037
C	C1SM3045	0.11168	0.22686	0.84277	-0.16428
	C2SM02	0.21361	0.31555	0.86372	0.01294
	C2SM25	0.17349	0.29121	0.88235	-0.01913
	C2SM515	0.22126	0.22124	0.89805	-0.10290
	C2SM1530	0.18356	0.23603	0.87041	-0.09194
	C2SM3045	0.17136	0.18499	0.82406	-0.15462
L	C13VVL5	0.10887	0.36762	0.24779	0.63640
L	C13VVL10	0.36307	0.42719	0.18856	0.64266
N	C13VVL15	0.35446	0.65252	0.33457	0.35807
O	C13VVL20	-0.15116	0.84737	0.11805	0.22977
P	C13VVL25	0.07955	0.83011	0.11351	0.24076
Q	C13VVL35	-0.01724	0.83739	0.17463	0.01216
R	C13VVL40	-0.03250	0.87003	0.02100	0.11086
S	C13VVL45	-0.02413	0.87422	-0.07473	0.00455
T	C16HHL5	0.40574	-0.04913	0.65455	0.20982
U	C16HHL10	-0.45247	0.52089	0.01382	0.40415
T	C16HHL15	0.25799	0.31709	0.64580	0.39865
W	C16HHL20	-0.29326	0.62903	0.16614	0.41720
X	C16HHL25	0.10075	0.52439	0.44206	0.55997
Y	C16HHL35	-0.06493	0.55767	0.29619	0.51390
Z	C16HHL40	-0.14247	0.56493	0.42233	0.34792
A	C16HHL45	-0.20567	0.47185	0.39715	0.43255
B	C16HVL5	0.78695	-0.04072	0.18210	0.13671
C	C16HVL10	-0.00944	0.67413	0.15212	0.26056
D	C16HVL15	0.23259	0.42647	0.62983	0.23664
B	C16HVL20	-0.08943	0.71367	0.29026	0.28138
C	C16HVL25	0.11235	0.59956	0.55063	0.18841
B	C16HVL35	0.21514	0.61814	0.43287	0.21560
C	C16HVL40	-0.06188	0.68916	0.45355	0.10544
A	C16HVL45	-0.00276	0.63335	0.44568	0.16907
A	C4HVL5	0.30866	-0.22181	0.67478	0.14950
K	C4HVL10	0.48493	-0.23845	0.70612	0.23703
L	C4HVL15	0.42627	-0.16026	0.80525	0.12529
L	C4HVL20	0.43036	-0.16592	0.80473	0.18089
N	C4HVL25	0.32102	-0.09501	0.81505	0.17575
O	C4HVL35	0.32359	-0.00680	0.74257	0.21682
P	C4HVL40	0.28216	0.21787	0.71591	0.20335
G	C4HVL45	0.17946	0.16711	0.65226	0.23539
R	C475HL5	0.74187	-0.38706	0.38685	-0.14095
S	C475HL10	0.74921	-0.35685	0.30655	-0.14169
T	C475HL15	0.80544	-0.34830	0.29189	-0.20431
U	C475HL20	0.78495	-0.28391	0.32259	-0.29598
T	C475HL25	0.78695	-0.23362	0.26799	-0.39142
W	C475HL35	0.71245	-0.22753	0.26818	-0.50639
X	C475HL40	0.78539	-0.21959	0.22938	-0.43903

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TABLE 41 DALHART. CORN (FACTORCX) -CONT.-

a. ROTATED FACTOR PATTERN

	FACTOR1	FACTOR2	FACTOR3	FACTOR4
Y C475HL45	0.69112	-0.23662	0.25637	-0.52555
B C475VL5	0.89063	0.19421	0.13065	0.15980
D C475VL10	0.92623	0.05353	0.16884	0.16293
B C475VL15	0.91941	0.13139	0.25647	0.16985
C C475VL20	0.90646	0.15547	0.22699	0.17839
D C475VL25	0.92603	0.09614	0.27403	0.10007
B C475VL35	0.90815	0.16543	0.23630	0.11861
C C475VL40	0.89330	0.17808	0.20948	0.13702
B C475VL45	0.90701	0.17552	0.23147	0.08732
C CMFMRHL	-0.18220	-0.13065	-0.16057	-0.92499
A CMFMRHC	0.05053	-0.29183	0.08186	-0.89948
A CMFMRVC	-0.00323	-0.27313	0.06953	-0.91252
K CPRT5	0.11233	-0.53223	0.03414	-0.63651

ORTHOGONAL TRANSFORMATION MATRIX

	1	2	3	4
1	0.52196	0.33659	0.76004	0.19131
2	0.57537	-0.67880	0.02021	-0.45581
3	-0.59630	-0.14440	0.60207	-0.51097
4	0.20232	0.63646	-0.24380	-0.70324

VARIANCE EXPLAINED BY EACH FACTOR

FACTOR1	FACTOR2	FACTOR3	FACTOR4
14.268035	11.429651	17.065988	7.345994

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TABLE 41 DALHART: CORN (FACTOR CX)

b. FACTOR PATTERN

	FACTOR1	FACTOR2	FACTOR3	FACTOR4
CFLD02	0.87040	-0.07598	0.36440	0.02917
C1SM02	0.86462	-0.12152	0.34123	0.02328
C1SM25	0.86117	-0.12899	0.38668	0.01572
C1SM515	0.85156	-0.00610	0.44148	0.04137
C1SM1530	0.78558	-0.03797	0.49211	0.03770
C1SM3045	0.74377	0.00218	0.49200	0.07704
C2SM02	0.87665	-0.07973	0.34047	0.02438
C2SM25	0.85554	-0.07130	0.39551	0.01878
C2SM515	0.85283	0.04218	0.42938	0.03900
C2SM1530	0.81921	0.00489	0.42748	0.03981
C2SM3045	0.74845	0.06015	0.44625	0.06024
C13VVL5	0.49064	-0.47197	-0.29400	-0.25195
C13VVL10	0.59956	-0.37020	-0.49303	-0.15257
C13VVL15	0.72743	-0.39544	-0.28711	0.15364
C13VVL20	0.34000	-0.76452	-0.07855	0.31837
C13VVL25	0.45326	-0.62515	-0.22199	0.34744
C13VVL35	0.40791	-0.58036	-0.01171	0.47835
C13VVL40	0.31305	-0.65938	-0.15025	0.46408
C13VVL45	0.22573	-0.61090	-0.15917	0.56654
C16HHL5	0.73287	0.18438	0.05203	-0.25631
C16HHL10	0.02698	-0.79786	-0.00360	-0.04761
C16HHL15	0.80849	-0.23546	-0.01451	-0.18378
C16HHL20	0.26474	-0.78253	-0.02911	0.00712
C16HHL25	0.67220	-0.54429	-0.15577	-0.14744
C16HHL35	0.47725	-0.64417	-0.12608	-0.09181
C16HHL40	0.50333	-0.61550	0.07988	-0.01691
C16HHL45	0.43607	-0.62777	0.07260	-0.14231
C16HVL5	0.56161	0.42180	-0.42359	-0.00724
C16HVL10	0.38744	-0.57872	-0.13327	0.20682
C16HVL15	0.78892	-0.25080	0.05801	-0.00148
C16HVL20	0.46798	-0.65829	-0.01875	0.16748
C16HVL25	0.71500	-0.41709	0.08167	0.13758
C16HVL35	0.69060	-0.38533	-0.06709	0.17980
C16HVL40	0.56456	-0.54230	0.15657	0.24138
C16HVL45	0.58282	-0.49956	0.09213	0.17499
C4HVL5	0.62791	0.27365	0.17786	-0.34837
C4HVL10	0.75488	0.34710	0.04929	-0.39250
C4HVL15	0.80454	0.31321	0.18976	-0.30019
C4HVL20	0.81501	0.29405	0.15942	-0.34194
C4HVL25	0.78868	0.18556	0.22322	-0.31782
C4HVL35	0.77248	0.10698	0.14432	-0.27237
C4HVL40	0.80364	-0.06376	0.12741	-0.12179
C4HVL45	0.69070	-0.10429	0.14129	-0.18188
C475HL5	0.52400	0.76165	-0.08155	-0.09145
C475HL10	0.47683	0.74408	-0.13826	-0.05063
C475HL15	0.48593	0.79888	-0.14986	0.01380
C475HL20	0.50271	0.78579	-0.08161	0.10761
C475HL25	0.46092	0.79520	-0.07417	0.22045
C475HL35	0.40224	0.80061	0.02824	0.29006
C475HL40	0.42638	0.80571	-0.07418	0.27196

TABLE 41 DALHART. CORN (FACTOR CX) -CONT.-

b. FACTOR PATTERN

	FACTOR1	FACTOR2	FACTOR3	FACTOR4
C475HL45	0.37540	0.80300	0.04495	0.29632
C475VL5	0.66011	0.31041	-0.56212	0.15957
C475VL10	0.66097	0.42573	-0.54164	0.06572
C475VL15	0.75154	0.36758	-0.49959	0.08767
C475VL20	0.73212	0.33929	-0.51745	0.10155
C475VL25	0.74313	0.42747	-0.45222	0.11136
C475VL35	0.73199	0.36094	-0.48375	0.14801
C475VL40	0.71164	0.33488	-0.50228	0.14665
C475VL45	0.72513	0.36761	-0.47145	0.17738
CMFMRHL	-0.43807	0.40223	0.50347	0.56962
CMFMRHC	-0.18172	0.63882	0.52090	0.43708
CMFMRVC	-0.21535	0.60089	0.54949	0.45028
CPRT5	-0.21634	0.71673	0.35566	0.12328

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TABLE 41 DALHART: CORN (FACTOR CX)

C. EIGENVECTORS

	1	2	3	4
CFLD02	0.17263	-0.01941	0.14881	0.01589
C1SM02	0.17152	-0.03105	0.13934	0.01268
C1SM25	0.17080	-0.03296	0.15791	0.00856
C1SM515	0.16889	-0.00156	0.18029	0.02253
C1SM1530	0.15581	-0.00970	0.20096	0.02054
C1SM3045	0.14751	0.00056	0.20091	0.04196
C2SM02	0.17387	-0.02037	0.13903	0.01328
C2SM25	0.16968	-0.01822	0.16151	0.01023
C2SM515	0.16914	0.01078	0.17534	0.02124
C2SM1530	0.16248	0.00125	0.17457	0.02168
C2SM3045	0.14844	0.01537	0.18223	0.03281
C13VVL5	0.09731	-0.12058	-0.12006	-0.13723
C13VVL10	0.11891	-0.09458	-0.20134	-0.08310
C13VVL15	0.14427	-0.10103	-0.11725	0.08368
C13VVL20	0.06743	-0.19533	-0.03208	0.17341
C13VVL25	0.08990	-0.15972	-0.09065	0.18924
C13VVL35	0.08090	-0.14828	-0.00478	0.26054
C13VVL40	0.06209	-0.16847	-0.06136	0.25277
C13VVL45	0.04477	-0.15608	-0.06500	0.30858
C16HHL5	0.14535	0.04711	0.02125	-0.13961
C16HHL10	0.00535	-0.20385	-0.00147	-0.02593
C16HHL15	0.16035	-0.06016	-0.00593	-0.10010
C16HHL20	0.05251	-0.19993	-0.01189	0.00388
C16HHL25	0.13332	-0.13906	-0.06361	-0.08030
C16HHL35	0.09465	-0.16458	-0.05148	-0.05001
C16HHL40	0.09983	-0.15725	0.03262	-0.00921
C16HHL45	0.08649	-0.16039	0.02965	-0.07751
C16HVL5	0.11138	0.10777	-0.17298	-0.00394
C16HVL10	0.07684	-0.14786	-0.05442	0.11265
C16HVL15	0.15647	-0.06408	0.02369	-0.00080
C16HVL20	0.09282	-0.16819	-0.00766	0.09122
C16HVL25	0.14181	-0.10656	0.03335	0.07494
C16HVL35	0.13697	-0.09845	-0.02740	0.09793
C16HVL40	0.11197	-0.13855	0.06394	0.13147
C16HVL45	0.11559	-0.12763	0.03762	0.09531
C4HVL5	0.12453	0.06992	0.07263	-0.18975
C4HVL10	0.14972	0.08868	0.02013	-0.21378
C4HVL15	0.15957	0.08002	0.07749	-0.16350
C4HVL20	0.16164	0.07513	0.06510	-0.18624
C4HVL25	0.15642	0.04741	0.09115	-0.17311
C4HVL35	0.15321	0.02733	0.05894	-0.14835
C4HVL40	0.15939	-0.01629	0.05203	-0.06634
C4HVL45	0.13699	-0.02664	0.05770	-0.09907
C475HL5	0.10393	0.19459	-0.03330	-0.04981
C475HL10	0.09457	0.19011	-0.05646	-0.02758
C475HL15	0.09638	0.20410	-0.06120	0.00751
C475HL20	0.09570	0.20076	-0.03333	0.05861
C475HL25	0.09141	0.20317	-0.03029	0.12007
C475HL35	0.07978	0.20455	0.01153	0.15799
C475HL40	0.08456	0.20585	-0.03029	0.14813

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TABLE 41 DALHART CORN (FACTORCX) -CONT.-

C. EIGENVECTORS

	1	2	3	4
C475HL45	0.07445	0.20516	0.01835	0.16140
C475VL5	0.13092	0.07931	-0.22955	0.08692
C475VL10	0.13109	0.10877	-0.22118	0.03580
C475VL15	0.14905	0.09391	-0.20401	0.04775
C475VL20	0.14520	0.08669	-0.21131	0.05531
C475VL25	0.14739	0.10921	-0.18467	0.06066
C475VL35	0.14518	0.09222	-0.19755	0.08062
C475VL40	0.14114	0.08556	-0.20511	0.07988
C475VL45	0.14382	0.09392	-0.19252	0.09661
CMFMRHL	-0.08688	0.10277	0.20560	0.31026
CMFMRHC	-0.03604	0.16321	0.21271	0.23807
CMFMRVC	-0.04271	0.15352	0.22439	0.24526
CPRT5	-0.04291	0.18312	0.14524	0.06715

IV. Conclusions

The statistical analyses summarized herein have been examined, as yet, in only a preliminary fashion. Hence, relatively few interpretive comments are contained in this report. The major need for explication of the separate effects of variable cover types, soil moisture profiles, soil textures and the sensor variables - especially the actual response kernels or response weighting functions - is rendered difficult by the convolution of all these variables. The statistical analyses contained within this report are intended as helps toward that end. Such interpretive efforts remain to be done. Finally, the continued review of the analyses efforts of other researchers in this field and the comparative examination of their and our results also remains to be done. For example, Lees (1982) shows a marked difference in his conclusions vis a vis those of Schmugge (1980) on the utility of soil texture for the normalization of the volumetric soil moisture data.

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